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AMERICAN JOURNAL OF OPTHALMOLOGY
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CONCERNING LAMELLAR MEMBRANES OF THE ANTERIOR SURFACE OF THE LENS

T. B. HOLLOWAY, M.D., AND
ALFRED COWAN, M.D.
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After a review of the literature, four cases are described to illustrate the disturbances of the zonular lamella of the anterior lens capsule which are sometimes encountered in relation to injury by heat or other causes. Read before the American Ophthalmological Society, June, 1930.

During the past seven or eight years an increasing number of observations showing pathologic changes on the anterior surface of the lens has attracted more attention to the character and extent of the zonular lamella. As quoted by Goulden[1] and Meyer,[2] Arnold did not regard the lens capsule as one homogeneous membrane but believed there was an outer layer belonging to the zonula. In 1882 Berger demonstrated the lamellæ in the lens capsule by destroying the cement substances with a solution of permanganate of potash. This observer and later Schwalbe and Retzius believed that the outer zonular layer was of mesodermal origin in contradistinction to the ectodermal origin of the hyaline capsule. As is well known, most subsequent observers believe the entire capsule to be ectodermal and the product of the cells that line it.

One naturally turns to the splendid work of Ida Mann[3]. In her recent volume she illustrates the origin of the fibers of the tertiary vitreous, showing the fibrils arising from the summits of the ciliary epithelium. Concerning it she comments as follows: "With regard to the mode of attachment of the two ends of the fibers of the tertiary vitreous (or suspensory ligament of the lens, as it can now be called) there has been some controversy. At their ciliary ends they are obviously attached to the surface of the ectodermal cells themselves, since they arise as processes of them. It has been suggested (Wolfrum) that in the adult they pass between the cells and gain attachment to a basement membrane or membrana limitans externa. This seems unlikely, both from their development and from the fact that in the adult there is no true membrana limitans externa in the ciliary region, since there are no Müllerian fibers to form it. At their lental ends they are firmly attached to what is known as the zonular lamella of the hyaline capsule of the lens. This, the outer portion of the capsule, has been considered by Schwalbe to be derived from mesoderm, but there seems very little ground for this assumption. It is not the remains of the vascular capsule, since this can be seen on the surface of the hyaline capsule, and its final complete atrophy and disappearance followed. . . . . It might possibly be formed by the coalescence of the ends of the zonular fibers themselves, but in that case it would probably not extend all around the lens. It is much more likely that the whole capsule, including the zonular lamella, is a secretory product of the lens itself."

Busacca's[4] observations in 1927 provided additional important information. By means of the silver impregnation method of Bielchowsky, which gives a contrasting black stain, he demonstrated a thin membrane, extremely thin over the central portions of the lens; in other words, it covered the whole hyaline capsule. Still further, in addition to the fibers that spread out on the surface there were other bundles that penetrated into the outer portions of the lens capsule. Suf-

ficient evidence has not been brought forward to establish an uniformity of opinion concerning the extent of the zonular lamella. Thus, Elschnig believes that it extends at least over the anterior surface of the lens, and Vogt concurs in this opinion; on the other hand, Jess and Busacca believe there is but a partial covering. Until we had observed certain of the cases here recorded and before we had looked through the literature we had not regarded the zonular lamella as covering the central part of the lens, but in the light of more recently recorded clinical observations, the possibility of a central covering must be accepted; however, the question is still an open one.

With these observations before us we may go on to the consideration of two clinical manifestations that have been attributed to the zonular lamella, manifestations that have been seen not infrequently in luxation of the lens and in association with glaucoma occurring in workers exposed to prolonged and intense heat, such as glassworkers and puddlers. The manifestation in glaucoma was shown by Vogt in his 1921 Atlas and was then regarded as due to retained capsulopupillary membrane. Later, in 1923, the same phenomenon was observed after operation on a case of glaucoma; still later, in 1925, Vogt published a series of cases showing the frequent accompaniment of glaucoma with this condition.

Case reports

Case 1. M., aged sixty-four years, cabinet maker, came to the out-patient department of the University Hospital on February 28, 1928, for the removal of a pterygium from each eye. V.R.E. = 6/6; V.L.E. = 6/15. On the nasal side of each eye a well-developed pterygium could be noted. By oblique illumination delicate grayish opacities could be noted on the lens surface pushing into the pupillary area from beneath each iris. There were a few striæ in the lenses. The discs were not pathologic, the vessels showed a moderate sclerosis, the fields were full and the tension was normal to the fingers.

Fig. 1 (Holloway and Cowan). Lamellar membranes. Case 1.

With the slit-lamp or biomicroscope one could note that the midzone of the lens showed broad areas of blue-gray fuzz or scalelike opacities which were attached to the capsule, many of them with upturned margins. Here and there could be noted a pigment dot. The expanse of the lesions was greatest towards the periphery of the lens, taper-

ing off, as a rule, towards the central area. The whole area presented somewhat of a lacelike effect. He was admitted to the hospital March 12, 1928. (Figures 1 and 2.)

One of us (Cowan) had seen a similar picture in the patient of a colleague, and, while we were not convinced that it belonged in the group of manifestations attributed to the capsulopupillary membrane, it was shown as such before the College of Physicians.

lenberg, Alling, and Vogt are practically in accord in their belief that the distribution of the flakes, and doubtless their adherence to the pupillary margin, depend upon the normal movements of the iris.

In this type of case the pupillary area is generally practically free and most of the manifestations are behind the iris. Kraupa prefers to regard these as dependent upon senile changes, in contradistinction to the type of case presently

Fig. 2 (Holloway and Cowan). Lamellar membranes. Case 1.

Shortly after this the patient complained of dimness of vision and pain in both eyes, more marked in the right. V.R.E., light perception; V.L.E., 6/15. Tension (Schiøtz) O.D. 42; O.S. 62 mm.

Since Vogt's observation similar cases have been reported by Goulden[1], Bedell[5], Pillat[6], Handmann[7], Alling[8], Meesmann[9], Kraupa[10], Rehsteiner[11], Hoorgina[12] and doubtless others. All of these cases are strikingly similar; many of the gray flakes, scales or plaques have free, curled margins while at times similar membranous tags are adherent to the pupillary margin and to the posterior surface of the cornea. The majority of observers now regard this type of case as due to degeneration of the zonular lamella. Wol-

to be described where the manifestations are chiefly in the pupillary area and which are frequently observed in glass workers, puddlers and blacksmiths (doubtless, chain-makers and tinplate workers would also show these changes). Kraupa is also of the opinion that the central area, which is generally clear, may ultimately show delicate or similar changes.

Schieck and others at the time they wrote regarded these manifestations as deposits upon the lens surface. They believed the posterior iris cells to be the origin of the disturbance; still later, Busacca and Hoorgina looked upon it as a deposition, the latter expressing the opinion that it was due to the action of a chemically changed aqueous upon the lenticular surface. This type

of case is designated by Kraupa as a senile destruction of the lens capsule.

Of greater importance in connection with this type of case is the question of its relation to glaucoma. Vogt[13], in 1925, recorded the histories of twelve cases in which glaucoma was present and all were well advanced in years. In the subsequent reports by Pillat (one case), Handmann (three cases) and Alling (seven cases), glaucoma was not observed. Alling expressed the opinion that glaucoma was not present, as a rule, contrary to Vogt's observation, but there was usually a cataract. In 1929, Rehsteiner recorded seventeen instances of lamellar desquamation, associated with glaucoma in seventy percent of the cases. In homes for the aged, out of 283 inmates over sixty years of age, four showed desquamation of the lamella and this was associated with glaucoma in three instances. In his recent report (1930), Vogt cited additional cases with the histologic and microscopic findings which corresponded to the biomicroscopic observations.

Of the last 185 cases of so-called primary glaucoma observed in the Zurich clinic, thirteen, or seven percent, were of the capsular type. Counting only 150 cases of chronic glaucoma, the incidence for capsular glaucoma would be 8.6 percent. Up to the time of writing, Vogt had observed forty-five cases of capsular desquamation, of which thirty-four, or seventy-five percent, had chronic glaucoma. He pointed out that the individuals were usually between sixty and eighty years of age, but occasionally younger. The development of the glaucoma was regarded as secondary to the desquamation and dependent upon the blockage of the filtration channels by the lamellar débris.

Fig. 3 (Holloway and Cowan). Lamellar membranes. Case 2.

We have not made any routine examinations among aged individuals, but in three instances of this type of manifestation of which we have knowledge glaucoma developed in two.

Let us now refer to the type of case occurring in glassworkers, recorded in 1922 by Elschnig[14], and to cases of traumatic subluxation of the lens as reported by Meesmann[9]. Following Elschnig's report other cases were recorded by Kubik[15], Goulden[1], Weill and Yole Levy[16], Rotter[17], Cords[18], Stein[19], Butler[20], Vogt, Meyer[2], Kraupa, and probably others. Two cases of this character came under our observation at the University Hospital last year.

Case 2. V., aged seventy years, puddler and heater in a rolling mill for forty years, came to the out-patient department of the University Hospital April 19, 1928, complaining of poor vision.

V.R.E. = 6/9; V.L.E. = l.p. Right eye: The cornea was clear. The lens showed anterior and posterior capsular and cortical opacities. No gross fundus lesions were noted. With the biomicroscope there could be noted within the pupillary area on the lens capsule the curled margins of a homogeneous, transparent membrane which described an angular course as it crossed the pupillary space. There were a few pigment dots scattered over its surface. The curled up margins were slightly serrated and glistening and projected into the anterior chamber where a few small tags floated freely with movements of the eye. (Figure 3.) One could not detect the exact beginning of the exfoliation. Left eye: There was a mature cataract but no membrane on its surface such as existed in the right eye. He was again seen February 13, 1930, when the right lens was practically mature, but the curled membrane was essentially the same as when first seen.

Case 3. D., aged sixty years, laborer, came to the out-patient department of the University Hospital on November 18, 1929, and stated that the vision of the left eye had been poor for the past ten years. No history of undue exposure to radiation was obtained.

Right eye: Extraction of cataract in 1915. There was a large colobоma above with remains of the capsule in the pupillary area. No fundus lesions could be seen. Vision = 6/12. Left eye: The cornea was clear and the anterior chamber of normal depth. By oblique illumination anterior and posterior polar changes could be noted in the lens. There were numerous vitreous opacities and slight pallor of the disc, but no definite fundus lesions could be seen. With the biomicroscope one could see on the anterior surface of the lens a thin, homogeneous, transparent membrane that extended across the pupillary area. The membrane was curled upward and rolled much like a scroll. From the temporal end of the scroll a rent extended upward for a greater distance than on the nasal side. Scattered over it were a few small gray opacities and a few brown pigment dots. One could not detect just where the line of exfoliation began. The lens

Case 4 (Holloway and Cowan). Lamellar membranes. Case 3.

capsule below the membrane was perfectly smooth and transparent. (Figure 4.) The tension (Schiøtz) of the right eye was 13.5, of the left eye 33.25 mm.

This one visit was the only opportunity we had for study. There was no response from a follow-up letter.

The vast majority of the patients exhibiting changes of this character have been exposed to undue and prolonged heat; in a few instances, such as case 3, this has not been the case.

Elschnig differed from Kraupa in his opinion as to the origin of the rupture. He does not believe that a diminution in the size of the lens could cause this, but that, as the result of the heat, a change in the elasticity of the zonula occurs with later rupture and detachment. Further, he did not regard the lens changes as dependent upon it. Kraupa, in a later publication, stated that the genesis of this type of detachment was not known and that he was not prepared to accept the opinion of Elschnig, but he did know that a change in volume did occur in glass workers' cataract and that this might lead to a protrusion of the lamella. He had also noted a rupture of the lens capsule lamella following a severe contusion of the globe. He further stated that the entire anterior layer of the capsule may detach in the form of a flat vesicle and subsequently rupture. Following this some adherence to the capsule may occur.

These cases have again opened up interest in the causation and development of the cataract that occurs in this class of workers, but this cannot be discussed here except to say that in the past the ultraviolet rays, the infrared rays and later on heat alone have been held responsible. It will be remembered that Verhoeff, in conjunction with Bell and Walker, believed that it was produced by heat. Vogt (1929) excluded heat and attributed it to the infrared rays, and stated that, in addition to the axial lens opacities, a partial or complete detachment of the anterior lamella of the anterior lens capsule may occur. These changes were only found in those over forty years of age; therefore, age must be a factor. He believed the same process was involved in those cases that developed capsulocuticular glaucoma, except that in these individuals the cuticle was fragile and crumbled while in the other instance the membrane retained its elasticity. Last year Elschnig reiterated his previous statement concerning heat as the factor responsible for the rupture of the zonula and excluded the infrared rays.

One other point concerning cataract may be briefly referred to. Elschnig regarded the lenticular changes as independent of the rupture. Kraupa quotes Busacca as opposing Löwenstein's theory that destructive changes in the lamella may permit ions in the anterior chamber to penetrate the lens and produce opacities.

Finally, we desire to mention briefly two other types of membrane at times seen in traumatized eyes. **Case 4.** G., aged eleven years, came to the outpatient department of the University Hospital on January 3, 1929. No history of trauma could be obtained from the mother or child. A linear extraction for cataract, regarded as traumatic, had been done at another hospital in January, 1924, and eleven months later this was followed by a discission.

A penetrating scar was present near the limbus at eleven o'clock, to which the iris was adherent. Some atrophy of the pupillary border of the iris was present. There was apparent behind the plane of the iris a thin, transparent, structureless membrane that stretched over the pupillary area and was drawn to a point up and out to be attached to the cornea at the site of the corneal scar. A few yellowish brown pigment granules were scattered over its surface. The lens substance was absent. The patellar fossa maintained its conformation and approximately its normal position and was lined with a thick, almost opaque, brownish yellow organized exudate, which in places gave a brilliant mother-of-pearl reflex. Several pencils of dense brown pigment could be noted on its surface. A large

arterial branch coursed over the limbus at the eleven o'clock position, passed through the corneal scar, turned down and back and then pursued an irregular course across the upper portion of the patellar fossa. No view of the fundus could be obtained. The left eye was negative.

This is the type of membrane that has been attributed to the vitreous and is illustrated by Butler in his book (figure 148). He comments upon the tendency of the vitreous to form membranes, at times from mere threads. One of us (Cowan) has also noted a membrane of similar character following intracapsular extraction of the lens but wholly placed just behind the iris and having an optically inactive space between it and an intact patellar fossa.

These last two types of case will be referred to at a future time in conjunction with other analogous types.

1819 Chestnut street (Holloway).
1930 Chestnut street (Cowan).

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MANAGEMENT OF ORBITAL INFECTIONS

With illustrative cases

JOHN GREEN, M.D., F.A.C.S.
SAINT LOUIS

A group of cases, either of actual orbital infection or simulating such infection, is arranged according to methods of treatment required. In some cases conservative methods were adequate; in others, moderate surgical intervention was necessary; while others demanded radical measures to limit the infection and save the lives of the patients. Read before the Saint Louis Ophthalmic Society, April 25, 1930.

Inflammation of the orbit, or orbital cellulitis, is usually marked by an acute onset with swelling of the lids, chemosis, and protrusion and more or less immobility of the globe. Severe pain and moderate to high fever are usually a part of the clinical picture. The condition is extremely alarming to the patient and his relatives, so that, as a rule, the surgeon's services are invoked without undue temporizing.

It is obviously the surgeon's first duty to determine the cause, if possible, for upon a correct understanding of etiology depends to a large extent the appropriate therapeutic attack. In some cases a very conservative course will suffice to bring the inflammation under control; in others a minimum of surgery answers the purpose; another group calls for very radical surgery.

I desire to present a few cases, which I shall group according to methods of treatment rather than etiology. I wish to consider, first, those cases in which the most conservative methods were used; second, those in which it was necessary to resort to a minimum of surgery; and third, those in which the most radical measures were demanded to prevent extension of the infection and to save life.

Case 1

W.S., male, aged eight years, was first seen May 20, 1926. On May sixteenth the father had observed that the right eye was beginning to protrude. The exophthalmos had slowly increased, accompanied by redness and swelling of the lids. At the time of observation the globe was advanced 5 mm. and was well splinted. The lids were red and tense, and there was moderate chemosis. The temperature was 101° F.

History: For several months the boy had complained of toothache. On May thirteenth the right side of his face had become swollen, and he had been compelled to stay out of school. Two days later a rash appeared, which had been called measles by the family physician. The following day the boy had complained bitterly of sore mouth, and a dentist had lanced several gum boils.

The patient was at once transferred to the hospital on May twentieth where he was seen in consultation by Dr. R. P. Scholz, who found no evidence of nasal, tonsillar, or sinus pathology. On May twenty-first the boy's teeth were examined by Dr. P. J. Murphy, a dentist, who found multiple dental abscesses; he extracted the upper right first and second deciduous molars, the lower right deciduous molar, the lower left deciduous molar, and the first right upper permanent molar. The following day the temperature had fallen to 100 degrees. A very tense swelling, in the form of a ridge, was noted parallel to the lower orbital margin. A similar swelling, though less prominent, was observed along the upper orbital rim. It was assumed that these swellings represented the anterior fascial planes which had been pressed forward and rendered tense by edema.

The only disquieting feature was a slow and irregular pulse. Dr. Leland B. Alford examined the patient, but failed to find any neurological explanation for the bradycardia. The patient was freely purged and kept on light diet; locally iced boric compresses were used. Five days later (May twenty-sixth) the eye had greatly receded, and

on the twenty-seventh the boy was discharged from the hospital. The course of the case from that time on was uneventful. By June seventeenth recovery was complete.

A direct extension of infection from the abscessed right upper desiduous and permanent teeth probably gave rise to an intraorbital phlebitis.

Case 2

J.T.M., Jr., male, aged six years, was brought to me November 22, 1927.

History: A week previously the right eye had become swollen following a sty which failed to come to a head.

Examination revealed a greatly swollen upper lid with deep fluctuation in the temporal half. There was chemosis confined to the temporal half of the bulbar conjunctiva; temperature, 100° F. The patient was hospitalized; continuous hot packs were ordered, and he was given calomel and a saline purge. The same treatment was continued for three days. Physical examination showed an acutely congested nose with mucopurulent discharge. On auscultation, a few râles were noted in the lower left chest posteriorly. Urinalysis was negative. On November twenty-fourth it was noted that the eye was slightly exophthalmic, down and nasally.

Operation, November twenty-fifth: A 3 cm. incision was made parallel to the eyebrow and 1 cm. from it. This incision began at a point vertical to the outer orbital rim, was deepened by blunt dissection and eventually reached a pocket of thick pus. A probe inserted at the inner end of the incision could be carried under the skin to a point just above the caruncle. Drains were inserted to the depth of the abscess, beneath the undermined skin.

The after treatment consisted of bichloride packs, with drainage and saline irrigation of the abscess cavity. The general progress was satisfactory, although three days after operation there was a slight degree of exophthalmos and chemosis. On December fourth, the boy was discharged from the hospital with drainage omitted. At this time there was partial ptosis, no exophthalmos, and only a small sinus which was rapidly closing. Six weeks later there persisted a very slight degree of ptosis.

Comment: It is questionable whether this case should be classified as an orbital inflammation. It seems probable that the depth of the abscess and its proximity to the orbital tissues gave rise to orbital edema and hence exophthalmos.

Case 3

M.D., aged thirteen years, was referred to me on April 5, 1930. The patient had been suffering for a number of weeks with a rather severe head cold with discharge. Five or six days before coming to Saint Louis it had been noticed that the right eyelids were very much swollen and that the eyeball had begun to protrude. Examination was made by Dr. Beisbarth, for I was out of the city. He found an exophthalmos forward and outward with a globe nearly immobile. X-ray plates of the sinuses revealed clouding of the right antrum and the ethmoid cells. Nasal examination by Dr. F. K. Hansel failed to reveal any pus. Temperature was 100.6° F. The boy had rather an uncomfortable night. The following day the exophthalmos was more marked and Dr. Beisbarth thought he detected fluctuation near the upper inner angle of the orbit. Accordingly, under ether, a 1.5 cm. incision was made into the orbit at this site. Exploration by probe and blunt dissection was carried back 3 to 4 cm. No pus was found. Hot boric packs were continued.

There was very little change in the appearance of the eye for two days when it was noted that there was increased motility of the globe with a slight diminution in the exophthalmos. At the same time pus appeared in the middle meatus and the nasopharynx. The following day pus began to flow freely from the incision. Eventually it was found possible to pass a probe about 5 cm. into the orbit where it encountered roughened bone. On April eighteenth mercurochrome injected through the incision passed into the

nose by way of the middle meatus, coming out through an opening in the region of the posterior ethmoid cells. Treatment consisted of deep drainage with rubber tissue (the drain being carried as far back as the opening into the nose), daily irrigation with boric acid solution, and radiant light treatment. The exophthalmos is rapidly receding and motility has been restored. Vision is normal; there are no eye-ground changes.

Case 4

Miss M.G., aged sixteen years, was seen March 19, 1926.

History: Right eye had begun to become more prominent than its fellow three years ago. Exophthalmos had increased for two years, but during the past year had not shown any change. At no time had there been severe pain. No history of general illness. Patient had been under the observation of a half dozen eye, ear, nose, and throat men, and had had operations on her right frontal and maxillary sinuses. She had finally consulted Dr. William T. Coughlin who asked me to see her.

Examination: There was marked exophthalmos (8 mm.). There was general limitation of motion, most marked at nasal side. Pupil moderately dilated and reacted to light. Vision: fingers counted at twelve feet. Ophthalmoscopically, great swelling of disc with slight tortuosity and engorgement of veins. The rhinological examination was negative. X-ray showed the ethmoid region devoid of air spaces, with enlarged orbital cavity.

Dr. Coughlin made an incision in the line of the eyebrow from the junction of the middle to the inner half and extending inward and slightly downward. Dissection into the orbit revealed a tumor near to the periosteum but not attached to it; the tumor was attached rather firmly to the sphenoidal fissure. The tumor was gotten out piecemeal and proved to be a myxoma. Two days later infection was well established. Pus poured from the drainage wound, and the lids were red and puffy. Cold packs were used. On March twenty-seventh the patient was given streptococcus serum intravenously and scarlet fever serum intramuscularly. Culture showed staphylococcus. Patient was given three doses of scarlet fever serum and showed definite improvement on March thirtieth. A later culture showed streptococci. Drainage was continued until April twenty-third when she was discharged from the hospital. At this time right vision was 6/10 partly. The swelling of the nerve head had entirely subsided.

On February 4, 1927, eleven months from the time of the operation, vision was 6/6 in each eye. Ophthalmoscopic appearances were negative, but there was a slight enophthalmos. Patient was last seen in 1929 when it was found that the right eye was divergent, but with normal vision.

Case 5

A.B., male, aged ten years, entered the eye clinic at Washington University on March 15, 1916.

History: Ten days before entering the clinic it had been noticed that the right eyeball was more prominent than its fellow. This had been ascribed by the family to a slight injury to the eyelid sustained ten days previously. (The patient had been struck on the closed lids by a piece of chalk thrown by a playmate.) The exophthalmos had steadily increased, unaccompanied by pain.

Examination: The protrusion was forward and somewhat downward. Upper lids tense and swollen; cornea roughened and dry by reason of failure of the lids to close completely. Moderate chemosis. Ophthalmoscopic examination showed red reflex only (cloudy cornea). Vision was hand motion at three feet. Rhinological examination by Dr. Sluder was negative. On palpation near the upper outer orbital rim, fluctuation was apparently elicited. Physical examination was entirely negative. White blood cells, 19,000; hemoglobin, 95 per cent. Urine showed a heavy trace of albumin and much pus. Wassermann and Pirquet tests were negative. Family history

and past history were negative. Teeth were in good condition.

Operation was proposed and accepted. An incision 5 cm. long was made parallel to the eyebrow and 0.5 cm. from it. By blunt dissection, the upper and outer part of the orbital cavity was opened. The exploration was continued by searching with the little finger to the nasal and temporal walls. A probe was passed in all directions nearly to the apex of the orbit, but no pus was found. Rubber tissue drains were inserted and the lids approximated with sutures to prevent further erosion of the cornea. Two days after operation it appeared that the patient was improving. The temperature had reached 98.6°; the tenseness of the palpebral skin was less. A day or so later the chemosis having increased, the bulbar conjunctiva was incised in several places. Eight days after operation, the cornea broke down forming an ulcer with hypopyon. Optochin one percent and atropin 0.5 percent were prescribed. During the two weeks subsequent to the operation the eye continued to protrude slowly. On March nineteenth an exploration was made revealing a tumor; a fragment of it was excised. The urine, which had cleared of pus, now contained large quantities of it; sodium citrate, which had been given for the first week and then omitted, was resumed. The exophthalmos became greater and very painful.

In the meantime the pathologist reported that the fragment of the tumor showed a round cell sarcoma. Complete exenteration of the orbit with removal of the periosteum was performed by Dr. Clopton. Convalescence was complicated by measles. The patient was discharged from the hospital May 1, 1915. He was readmitted May 29, 1915; between that day and his discharge, June 11, 1915, he received three x-ray treatments. At this time there was no sign of recurrence. On August thirty-first he was readmitted because of recurrence of the tumor which increased in spite of massive doses of x-ray. He died January 15, 1916.

The patient was seen by several of the ophthalmologists of the staff, and all agreed that the appearances pointed to orbital cellulitis rather than tumor.

Case 6

W.S., male, aged sixty-eight years, was seen July 26, 1920, in consultation with Dr. C. F. Pfingsten. Ten months previously the patient had been struck on the forehead by an iron bar; the nose had been abraded and (the patient thinks) possibly fractured. He had recently had a mucopurpulent discharge from the nose. Examination showed a dense and brawny induration of the skin and subcutaneous tissue over the site of the lacrimal sac which was tender. Exploration of the lacrimal passages failed to reveal pus, and the nasal duct was permeable. At this time the diagnosis of prelacrimal abscess seemed justified. The patient was sent to the hospital for x-rays of the head.

X-ray examination showed a fracture through the roof of the orbit. In the meantime the patient got rapidly worse, developing intense pain and moderate exophthalmos. Dr. W. T. Coughlin was called in consultation. Curved incisions were made parallel with the eyebrow and lower orbital margin. These two incisions were joined at the side of the nose and the incision was extended across the bridge of the nose. A drain was inserted deeply at the junction of the two incisions and rubber tissue was packed into the line of the incisions. Hot moist boric packs were used continually. Under this treatment, the patient improved rapidly. Ten days after the operation the packs were discontinued and the drains removed. On August eighteenth the vision had risen to 6/12. For a time there was edema of the lower lid incident to interference with the lymphatic return flow. The final visual outcome was 6/6.

Two years later the left eye was successfully operated upon for cataract.

Case 7

E.H., a physician, aged twenty-seven years, entered St. Mary's Hospital at 10 p.m., January 10, 1925.

Ocular history: On January fifth a sty, located on the right lower lid near the outer angle, had come to a head and had been opened by the patient with a new gold hypodermic needle which had been "flamed" before use. The lid had continued painful and the following day, January sixth, three more styes, in close proximity to the first, had appeared on the lower lid. On January seventh, the lower lid had been much swollen and the styes had shown a tendency to coalesce. At this time the upper lid had become swollen. The patient had consulted a local oculist who had used appropriate treatment (hot applications, etc.). On January eighth it had been noted that the globe was beginning to protrude, accompanied by deep boring pain and fever. On January ninth, a plug had been removed from the site of the original sty. He had been urged to enter a hospital but had temporized until January tenth when he entered St. Mary's Hospital where I saw him at 10:30 p.m.

Examination: The right eye was pushed forward to a level with the bridge of the nose and was completely splinted. The lower half of the bulbar conjunctiva was chemotic; vision, fingers at five feet. The inner half of the lower lid was occupied by coalescing hordeola; the outer angle presented a necrotic mass which included the outer third of the lower lid, the skin at the outer angle, and the conjunctiva of the globe and lid at this site.

The patient was immediately sent to the operating room. Under ethylene gas, several pus pockets on the lower inner lid margin were evacuated by incision and curettage. The necrotic area at the outer angle was explored and it was found that it led into the orbit fully 5 cm. This pocket was enlarged by blunt dissection; considerable necrotic material and a few drops of thick pus were spooned out and curetted out. A free canthotomy was done. A 1.5 cm. incision was made into the orbit extending from near the outer angle upward and inward and 0.5 cm. below the eyebrow. A similar incision was made through the lower lid into the orbit. Rubber tissue drains were placed in these openings. Vaseline was smeared freely over the exposed cornea and a moist boric pack was applied. Cultures from the orifice of the sinus and the depth of the orbit showed staphylococcus aureus.

The patient spent a restless night despite morphia and compound empirin tablets, and the condition the following afternoon was decidedly worse, with great pain and increased exophthalmos. The deep orbital drain was removed and the cavity irrigated, the fluid returning being blood stained. Dr. W. T. Coughlin was called in consultation and advised very free incisions into the orbit through the upper and lower lids. Accordingly the patient was again anesthetized and a curvilinear incision was made entirely through the upper lid extending from the outer to the inner angle and about 1 cm. from the eyebrow. This incision was carried into the orbital fat on either side of the levator tendon, but the latter and its overlying fascia were carefully avoided. A similar incision was made through the lower lid into the orbital fat. Both incisions were packed wide open with rubber tissue stuffed with gauze. The drains inserted at the first operation were not disturbed.

After treatment: Hot boric packs were applied almost continuously day and night. The eye was kept anointed with vaseline. Codeine and empirin tablets were given freely for pain. During the early postoperative days the temperature did not rise above 100.6°, most of the time being well below 100°. The wide orbital incisions oozed serum and blood, but at no time was pus observed. On the other hand, pus soon appeared at the opening of the sinus and there were points of great tenderness over the upper portion of the antrum and along the lower orbital margin. The right preauricular gland was enlarged. Vision dropped to light perception. About a week later, palpation in the mouth at the outer gingival border revealed bulging and tenderness, the abscess having burrowed into the cellular tissues of the cheek.

Ophthalmoscopic examination showed white retinal edema overlying the lower half of the retina. The disc could not be seen.

Improvement was slow and the exophthalmos did not begin to recede noticeably until January fifteenth. On January sixteenth pressure over the right temporal region produced a free flow of pus from the sinus. On January eighteenth I gave a subscapular injection of 2 c.c. of sterile defatted milk. This was followed by a slight rise in temperature to 101.4°. Three days later, 6 c.c. were given. I could not convince myself that the slightest good came from these milk injections.

On January twenty-third, a full-blown sty was observed near the inner angle of the left eye. This was promptly opened and rapidly subsided without giving rise to any further trouble.

During the course of the cellulitis, a careful physical examination was made. This proved entirely negative with the exception of one occasion when a trace of sugar was found in the urine. He was regarded as a diabetic and twenty-five units of insulin were given. The blood Wassermann test was negative. Clinical and x-ray examination of the sinus showed nothing abnormal. After recovery it was found that the right nerve head was completely atrophic with narrowed arteries and veins. In July, 1928, a plastic operation on the lid greatly improved the position of the outer angle. (A more detailed account of case 7 was published in the American Journal of Ophthalmology, 1926, volume 9, pages 34-37.)

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ORBITAL COMPLICATIONS IN SINUS DISEASE

A review

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CINCINNATI

The more usual orbital complications in sinus disease are mucocele, osteoperiostitis, diffuse orbital swelling, abscess, involvement of the optic nerve, uveitis, and functional disturbances, especially in the intraocular and extraocular muscles. More or less constant ocular signs of sinus disease are lacrimation, edema of the lids, episcleritis fugax, and proptosis. Five case reports are given. Read before the Indianapolis Eye, Ear, Nose, and Throat Society, January 9, 1930.

History

Perhaps the earliest recorded instance of ocular disease as a result of sinus infection is that of Hippocrates (460-370 B.C.) In Littré's French translation of the works of Hippocrates is found this case report.

"The tooth of Hegesistratius himself had a suppuration near the eye, a suppuration was formed towards the last tooth, forthwith complete cure of the eye; a thick pus came through the nostrils; some small round tags of flesh were detached at the gums; in his case it seemed that a suppuration of the third tooth would occur; then this was averted, but all at once the jaw and the eye swelled. Those in whom abscesses of the eyes are formed in high fever, have very red cheeks and hemorrhages."

Ambroise Paré (1510-1590), who was most accurate and precise in his clinical descriptions, speaks only vaguely of the inflammation of the cellular tissues of the orbit. In his description of proptosis he cites the case of a woman who had so much pain, inflammation and swelling that the eyes protruded from her head.

In 1750 Runge, in his surgical thesis presented at Haller, devoted himself to the study of maxillary sinusitis.

In 1761 Jourdain published his treatise on maxillary sinus abscess.

In 1771 the immortal John Hunter, in his "Natural history of the human teeth", studied the sinuses with care.

In 1820 Langenbeck described mucocele under the name of hydatides.

The latter half of the nineteenth century revealed itself as the golden age of medicine, and the subject of sinus disease received its share of the stimulus for knowledge—great names such as Von Graefe, Zinn, Knapp, Leber, Rollet, Stanculeanu, Dreyfuss, Herzfeld, Panas and Onodi, besides a host of others, are liberally found in the medical literature on this subject.

Classification

An excellent classification of those diseases of the nasal sinuses which affect the eye was given by Mackay in 1908. He divides the orbital complications into four groups:

1. Mucoceles of the sinuses.
2. Acute or chronic sinusitis with external signs of orbital cellulitis, orbital abscess, tumor growth, edema of eyelids or apparent dacryocystitis.
3. Sinusitis without external signs of orbital inflammation, but (a) with ophthalmoscopic signs such as optic neuritis, neuroretinitis, retinal thrombosis or phlebitis; or (b) without ophthalmoscopic signs, but with visual disturbances such as central scotoma, visual field defects, ocular muscle palsies or fifth nerve disturbances.
4. Cases of iritis, uveitis, keratitis, and lens and vitreous opacities.

Anatomical consideration

H. Marx in the Handbuch der Hals-Nasen- und Ohrenheilkunde points out that orbital complications of nasal sinus disease are the result of a direct anatomical relationship between the orbit and sinuses. More than two-thirds of the wall of the orbit is made up of thin bone, which at the same time is the wall of the nasal sinuses. It is of practical importance that the extent of variation of the formation of

the sinuses is extraordinarily great and, therefore, the topographical relations between orbit and optic canal are not constant. In the maxillary sinus the variations of the lumen in the upper middle portion are especially important. Zuckerhandl has described cases in which the orbit from the infraorbital canal to lateral nasal wall was bounded by the antrum wall. In the newborn, and more or less in children until the second dentition, the antrum has a very narrow porch, which only bounds the middle part of the orbital rim. This is important in considering the relation between the first teeth buds and the orbit.

The relation of the frontal sinus to the orbit depends upon its position in the horizontal part of the orbital roof. As a rule, its rim forms only the front portion of the orbital roof. Onodi, however, found that it could have a great extent, so that it occupies the entire portion of the roof and can bound the territory of the lesser sphenoid wings, the sphenoidal sinuses, the optic foramen and the middle cranial fossa. De Kleijn found the frontal sinuses extending to the optic foramen in two skulls.

The relations of the ethmoid to the orbit are also very variable. Especially is it of practical importance that the anterior ethmoid cells spread themselves laterally and build a part of the orbital roof.

The topographical relation between the posterior ethmoids and the sphenoids is more complicated. Onodi has described not less than thirty-eight different formations, which he divides into twelve groups. He also establishes the fact that the optic canal can pass nearly free through one of the posterior cells; and furthermore, that the sinuses of one side can come in relation to the optic nerve of the opposite side. It is possible that the dural sheath of the optic nerve in the optic foramen, and likewise the periosteum of the perforative hole, make a direct continuation with the orbital periosteum. The thickness of the bony walls is different in the region of the posterior sinuses.

The bony walls of the orbit make no continuous partition with the sinuses; there are many small openings which break up the bony substance. Of special pathological importance are the small open canals traversed by vessels and nerves. The most constant openings and the largest are the ethmoidal foramina; moreover, the paper plate of the ethmoid is traversed by multiple little veins. In twenty cases Onodi found a dehiscence of the ethmoid canal, which he named semicanales ethmoidales. He points out that in this half-canal the ethmoidal vessels pass into the nasal sinus free of the mucosa, and further, that at the ends of the half-canal the mucosa rests upon the orbital periosteum and dura mater. The orbital wall of the frontal sinus is seldom defective, Onodi finding only three cases of dehiscence out of 4,000 skulls.

The communication of the venous system of the sinus mucosa with that of the orbit is through thin multiple small venæ perforantes. There are in addition some large venous stems which are more or less constant. The constant ones are the ethmoidal veins which empty into the superior ophthalmic, and rarely communicate with the inferior ophthalmic. There is also a small vein from the frontal sinus which unites with the superior ophthalmic after it has perforated the bony margin.

Kuhnt, Onodi, Eversbusch, Pagenstecher, and Jakob take as an established fact that there is a lymphatic union between the orbit and the sinuses. There is as yet no anatomical proof of this however.

Frequency of complications

Statistics here are unreliable, but most authors agree that orbital complications of nasal sinus infection are rare. Meller of Fuchs's clinic found one case out of 9,000 eye cases; Kuhnt, 0.13 percent; Pfiffl, 0.55 percent; Heidelburg Clinic (1913-1920), 274 out of 6,494, or 3 percent. Now, however, that we believe in the focal infection theory of iritis and uveitis, the percentage should rise.

Birch-Hirschfeld found the sinuses

involved in 684 cases of orbital inflammation; the frontal was affected in 28.8 percent, the antrum in 21.8 percent, the ethmoid in 20.5 percent, and the sphenoid in 6.1 percent. In 14.7 percent, several were affected. There was a mortality of 14 percent.

In adults the frontal is particularly at fault, due to its relatively late development. Most orbital complications in children following scarlet fever are derived from the ethmoids, the youngest case on record being in a three days old infant observed by Wildenberg. The antrum in children also contributes its share of complications, more often than in adults, and orbital abscess is especially frequent in antrum infection according to Birch-Hirschfeld. Arnold Knapp, however, believes this to be exaggerated and states that "disease of the antrum itself rarely seems to cause an orbital complication unless through the intermediary of the ethmoidal cells."

Orbital complications

It seems best to approach this subject by a consideration of the sinuses in turn, after Rollet in the French Encyclopedia of Ophthalmology.

A. Frontal sinusitis (most frequent)

(1.) Mucocele. Rollet in 1896 first suggested this term. It is met with especially in subjects from twenty-five to forty years of age, and begins slowly and insidiously. The patient usually complains of pain in the region of the frontal sinus, although it is not unusual to have the patient recognize by chance a swelling in the superior internal angle of the orbit. It is characterized by three signs, (a) orbital tumor, (b) exophthalmos—the eye sometimes deviated down and out, (c) nasoorbital hyperostosis—this is a curious deformity of the root of the nose, first discovered by Rollet. The root or bridge of the nose, instead of being concave from above downwards and convex transversely, presents a flat surface whose width is increased 5 cm. The upper lid is smoothed out and the palpebral fissure is narrowed. Rollet considers this pathognomonic of a distension of the frontal sinus by mucus, pus, or benign neoplasm, i.e., where there is a very slowly developing process at work.

The mechanical pressure of a mucocele can cause the eye to proptose, and the position assumed may be down and out. Corneal complications can follow if there is exposure. Visual field disturbances can ensue by pressure on the eyeball, with resultant loss of vision.

(2) Encysted empyema, pointing in the upper inner angle of the orbit and producing swelling and ptosis of the lids.

(3) Orbital osteoperiostitis.

(4) Diffuse orbital suppuration and abscess formation, producing exophthalmos with swelling of the lids, obliteration of the furrow of the upper lid, and a fixed and immobile eye. The proptosis may be directly forwards; in other cases it deviates down and out. The retroorbital fat is then exposed to infection and unless there is rapid surgical intervention there is danger of cavernous sinus thrombosis and death.

The ocular muscles may be involved, most frequently as a result of the proptosis, but also as a direct injury to the muscles themselves. If the inferior wall of the sinus is necrotic and involves the pulley, the superior oblique loses its function and diplopia results. This is however, unusual, and is most frequently seen following operation. The diplopia may be transient and disappear spontaneously, or it may persist. In any event it is not wise to attempt to correct this until several months have passed.

Epiphora is frequently seen in frontal sinusitis and can be explained either as a result of pressure on the lacrimal gland, or a functional disturbance of Horner's muscle, the tensor tarsi. Fistulization often occurs and may be situated in the lids or open into the conjunctiva. Ectropion by scar tissue formation can then be produced.

The ocular complications of orbital cellulitis are many. Schwendt found that fifty percent of his cases showed

corneal lesions. Keratitis with ulceration, perforation, and panophthalmitis may occur. The cause of the keratitis may be mechanical, that is to say by exposure and lagophthalmos, or the constant bathing of the cornea in pus and toxic material; or trophic, in that the function of the corneal nerves is interrupted by compression.

A suppurative choroiditis has been described as directly due to cellulitis. Detachment of the retina, which Graefe attributed to strangulation of the choroidal veins producing a transudation, is also a sequela. Other complications of frontal sinusitis are papillitis, thrombosis of the central vein, and intermittent paresis of accommodation which Fish has described. The thrombophlebitis of the orbital vessels, according to Uhthoff, is unusual after accessory sinus disease and is more frequent from extension of a process in the face.

B. Maxillary sinusitis

(1) Osteoperiostitis of the orbit. This complication is rather rare because of the slight tendency for the diseased process to invade the vault of the sinus and come in contact with the roof. The irritated bone builds up a defense and creates a bony partition which is a true barrier to microbic invasion. If the infection does reach the vault, the orbital floor is attacked in two ways. If the disease is of slow development there is a rarifying osteitis and the periosteal reaction is more or less marked. When the inflammation is rapid, pus detaches the periosteum; the bone, being rapidly deprived of its nutrition, undergoes necrosis and destruction. If the osteoperiostitis is chronic, an abscess opens into the lower lid. The eyeball projects forwards and at times a little laterally. The optic nerve can be involved, or an edema of the lower lid and an infraorbital neuralgia can ensue.

(2) Orbital abscess can be caused by direct contact or from hematogenous origin. Gaillard in 1887 described a small vein which goes directly from the antrum into the superior ophthalmic veins.

(3) Optic nerve involvement.

(4) Lacrimal apparatus complication.

(5) Reflex or metastatic disturbances such as iritis, iridocyclitis, neuroretinitis, accommodation asthenopia, and the phorias.

C. Ethmoidal sinusitis

(1) Mucocele, same as under frontal sinus. It is always seen in young people and is a result of repeated attacks of more or less attenuated infections of the mucosa. Proptosis presents one of the first symptoms. When the mucocele springs from the posterior ethmoidal cells it produces a protrusion directly forwards similar to that caused by tumors in the depth of the orbit, although not so marked. The deviation, however, is generally down and out.

(2) Suppuration.

(3) Osteoperiostitis.

D. Sphenoidal sinusitis

The ocular complications are:

(1) Functional disturbances—especially epiphora.

(2) Asthenopia due to faulty accommodation.

(3) Cavernous sinus thrombosis—not rare.

(4) Orbital abscess and its complications.

(5) Optic neuritis.

(6) Nerve palsies, especially the sixth nerve. This nerve, which passes into the orbit in a groove in the sphenoidal sinus wall, is particularly liable to injury by infection or toxins if the sphenoidal wall is thin and diseased.

Signs pointing to sinus disease

It will be seen then that there are more or less constant signs pointing to sinus disease:

(1) Lacrimation. Turner of Edinburgh lays great stress on the importance of epiphora and states that in all cases of unilateral lacrimation the sinuses should be carefully investigated.

(2) Edema of lids. If a patient presents unilateral edema of the lids on arising in the morning, which disappears as the day progresses, and is made worse by an acute nasal infection, the sinuses should always be suspected.

(3) Episcleritis fugax. De Schweinitz coined this term, signifying a fleeting episcleritis; sometimes it is due to sinus disease.

(4) Proptosis. This is a very important sign and is fairly constant. G. S. Hett states that where an eye projects forward, outward and downward, suppuration of the frontal sinus or ethmoid is likely. A deviation downward and inward suggests frontal sinus or lacrimal gland suppuration. Proptosis with deflection upwards is not usually due to a suppurating sinus, for a suppurating antrum rarely does this; one should always suspect malignant disease. There is usually suppuration in malignant disease. One should bear in mind that malignant disease arising in the sinus can invade the orbit and cause symptoms similar to those described.

Case reports

Case 1 (frontal sinusitis): H. L., boy aged ten years, complained of left facial pain for five days. Pus was discovered coming from middle meatus. Two days later left eyelids became inflamed and in a short time the eyelids were swollen shut. He had marked supraorbital tenderness and swelling, with fluctuation below orbital rim. Proptosis and edema of left eyeball developed, the proptosis being straight forwards. Motility was markedly restricted in all directions, producing diplopia. The ophthalmoscope showed the ocular media clear, the optic disc congested and the veins dilated and dark. The field of vision was normal. Colors could be distinguished, although they appeared darker than when seen with the sound eye. This is an important early sign of involvement of the papillomacular bundle. A large incision, made under the left brow, and continued through the periosteum, made an opening for a probe to be passed along the orbital roof. An enormous gush of foul pus was the reward. Recovery was uneventful.

Case 2 (pansinusitis, especially frontal): Miss M. A., aged fifty years, complained of swollen and painful left upper lid of eleven days duration. It began as a small swelling beneath the brow, associated with slight diplopia. The lids rapidly became boggy and tender, and in a short time she was unable to open her eye.

The history of her condition before onset is most instructive, for if the correct diagnosis of a chronic frontal sinusitis had been made previously, she would have been spared much trouble, pain and worry. Seven months before the acute onset she had had a slight swelling of both eyelids, and conjunctival edema of the left eye, but no headaches. For four weeks she had been treated for eye strain and kidney trouble by an ophthalmologist. Four months later she had had a recurrence of the edema of the lids, diplopia, and slight protrusion of the left eye. Her case had been diagnosed as hyperthyroidism by her local doctor. For as long as she could remember, she had had nasal catarrh and a purulent nasal discharge at times.

Examination showed chemotic left lids, slight proptosis down and out, some disturbance of motility up and out, and blurred images on looking up and towards the left. There was a decided preauricular adenitis on the left side. X-ray showed a pansinusitis and Dr. H. H. Vail performed an operation consisting of a left Killian, a radical antrotomy, and an ethmoid exenteration. Five days later the eye could be opened, and recovery was uneventful.

Case 3 (maxillary sinus disease following scarlet fever): boy, aged five years, had scarlet fever of eleven days duration. Nine days after onset the right eyelids became inflamed and swollen, and the globe proptosed. There was decided limitation of movement. The antrum was found to be infected, and was drained of a large amount of thick bloody pus by Dr. C. Jones. Nasal drainage, associated with hot fomentations to the eye, resulted

in subsidence of the process in a few days with complete recovery.

Case 4 (mucocele of frontal): Mr. W. B., aged thirty-seven years, complained of bulging and displacement of the right eye for seven months. The disturbance began with a half-moon cloudiness in the lower field of the right eye. There was occasional diplopia which was becoming worse. No pain was experienced unless the upper lid became caught behind the eyeball, which occasionally happened. The proptosis had not increased in several months.

Examination showed such a degree of proptosis that the globe hung over the lower rim of the orbit. The eye was displaced downward and slightly out, so that the margin of the lower lid was on a line with the upper margin of the cornea. A pulpy mass could be felt in the upper outer quadrant and behind the eyeball. The motility was affected only directly upwards. The vision was 20/50 and ophthalmoscopic examination showed nothing abnormal. X-ray showed a break in the outer margin of the right orbit which led into a large cavity to the right of the frontal sinus. A large mucocele of the frontal sinus was removed through an eyebrow incision by Dr. H. H. Vail. On the last examination two years later, the vision in the right eye was 20/20 and there was no defect in the ocular movements or in the field of vision.

Case 5 (neoplasm of sinuses invading orbit; death): Man, aged fifty-two years, complained of pain in his head of two months' duration, bulging of the left eye, and loss of vision. Six months before admission some nasal polypi had been removed by his physician. Four months later he had had pain behind the left eyeball which had gradually become worse. Some pus had drained from the left nostril and his local physician had performed a second nasal operation, details of which are unknown. Five weeks before admission the left eyelids had become swollen and painful, and the eyeball had begun to bulge forwards. Two weeks later the eye had become totally blind.

Examination showed proptosis directly forward, a pale and edematous disc, and a totally blind eye. The temperature was normal. X-ray showed clouding of the left antrum, and the ethmoid dense enough to contain fluid. Exenteration of the orbit was carried out and a large amount of thick greenish pus as well as gritty tissue was removed. The specimen showed spindle cell sarcoma. Dr. H. H. Vail performed a radical operation on the left antrum and ethmoid sinuses through the orbit, removing a cupful of tumor tissue. The nasoantral wall was destroyed by tumor tissue. The patient died of cerebral metastases two months later.

Conclusion

The fact that two-thirds of the orbital wall is of thin bone, which is at the same time the partition of the nasal sinuses, makes the contents of the orbit particularly liable to damage. This injury can assume different forms and result in various lesions which have been described. The fact of prime importance, however, is the necessity for an expert rhinological examination in all cases of iritis, uveitis, neuroretinitis, retrobulbar optic neuritis, thrombosis of the central vein, vitreous opacities, unilateral epiphora, proptosis, and edema of the lids. Finally, it is suggested that ophthalmologists should be ever mindful of nasal pathology in its possible relation to ocular disturbances.

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Note: Authors mentioned in the paper, but not included in the list of references here given, are quoted from the article by H. Marx.

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BEE STING OF THE CORNEA

With case report

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The literature concerning bee sting and analogous injuries is carefully reviewed, with special consideration of the anatomy and chemistry of the stings and of the basis of various complications of such injuries, such as glaucoma and corneal abscess. In a new case here reported, the cornea was penetrated by two bee stings and the patient requested enucleation on account of constant pain and irritation. Removal of the stings was accomplished at four operations under local anesthesia.

Flury says:

"Bee poison has been used therapeutically in many countries in the treatment of many varied diseases such as rheumatism, lumbago, sciatica, gout, dropsy, and eye diseases, not only as a folk remedy in the hands of the common people but also by scientifically educated physicians.

"The main indication for bee-sting cures is found in the rheumatic affections including diseases of the heart valves associated with articular rheumatism and arthritis deformans.

"Gradually increasing, up to fifty or even one hundred stings are applied daily, leading as a rule to severe general symptoms such as edema, fever, vomiting, diarrhea, and considerable disturbance of heart action. Thus it can be seen that we are not here dealing with an ordinary dermal stimulating agent, and further research and investigation as to its true nature are very much to be desired."

Anatomy of bee sting

Snodgrass' excellent book, "Anatomy and physiology of the honey bee", has been drawn upon for the following description of the bee sting.

The sting of the bee is located in the sting chamber at the end of the abdomen. The bee dies after stinging its victim, as it leaves behind all of the ninth and tenth segments, most of the eighth segment, the poison glands, and the terminal part of the alimentary canal. The stinging apparatus which is left in the victim keeps on automatically pumping poison.

The sting itself is composed of three parts: a single, hollow, dorsal piece, known as the sheath, and two ventral parts consisting of long, slender rods called the lancets or darts, which slide freely upon tracks on the ventral edges of the sheath. The hollow of the sheath is simply a groove along the entire length of its ventral surface which is expanded in the bulb into a large cavity, but is closed below by the two lancets and thus converted into a tube, which is the poison canal of the sting. The lancets are barbed as can be seen in the illustration.

There are three systems of glands associated with the sting. One consists of two sets of gland cells that have been described as lubricating glands. The other systems are the acid glands and the alkaline gland, which together secrete the liquid that is driven through the canal of the sting.

The poison is ejected from the sting by a pumping apparatus situated within the bulb. This consists of two pouchlike lobes, having their concavities directed posteriorly, attached to the upper edges of the bulb chamber. When the lancets are pushed backward the walls of the lobes flare apart against the poison contained in the bulb and drive this liquid before them into the

channel of the shaft, while at the same time they suck more poison into the front of the bulb from the glands. When, on the other hand, the lancets are retracted the pouches collapse so that they may be drawn back through the liquid filled bulb without resistance, but they are ready for action again as soon as the movement of the lancets is reversed. The lancets need not work together; in fact, they more often work

Bee sting of the cornea (Young). Lancet of bee sting removed from patient's cornea. Barbs well shown. Lancet was broken in removal.

alternately, the lobes being of such size as to be effective either when acting together or separately.

Chemistry of bee poison

Langer demonstrated the presence of hydrochloric acid, phosphoric acid, sodium and calcium. Langer described the bee poison as an organic base precipitated by alkalies, especially ammonia, giving general alkaloid reactions and not destroyed by dry or moist heat (100 degrees C.).

Flury, after obtaining bee poison by several other methods, finally obtained the pure secretion by luring bees one at a time to leave the hive; they were then grasped by the fingers or by forceps and placed on thick, moist filter paper. The paper containing the poison was dried, the parts spotted from bowel discharges cut out, and the paper preserved in glass cases tightly closed.

Flury prepared the described "base" from about 200,000 living bees according to Langer's method, using about one gram for chemical analysis. He found the following eight components: 1, a nitrogen-containing derivative of the indol series isolated in the form of tryptophan; 2, cholin; 3, glycerin; 4, phosphoric acid; 5, palmitic acid; 6, an unsaturated high molecular noncrystallizing fatty acid; 7, a lower, volatile fatty acid, presumably butyric acid; 8, a nitrogen-free fraction.

"The latter forms the active portion of the poison. The author believes himself justified in assuming that the active substance in bee poison constitutes a transition between protein-free sapotoxin of animal origin, such as crotaloxin and ophiotoxin of snake poison and other related substances, on the one hand, and the poisons of the cantharid group on the other."

Stings by other insects

Lewin and Guillery state that wasp stings are worse than bee stings. Michel in 1862 reported the death of a boy after a sting on the eyebrow by a wasp, the sting having invaded the supraorbital branch of the trigeminus; the boy died in ten minutes.

Kraupa reports a case in which a wasp sting caused a serious reaction, the patient being immune to bee stings. Kraupa concludes that the wasp poison and bee poison must contain different chemical substances.

Zander and Geissler state that the stings of wasps are more dangerous than those of bees and are followed by a more prolonged erythematous and edematous swelling.

Purcher reports a case of sting in the upper lid with injury to the cornea but believes that it was a wasp sting rather than a bee sting.

Le Plat, Purtscher, Gallemaerts, Kusano, Bar, Koyanagi, and Yoshida all report cases of wasp sting of the eye.

Gonzalez reports the general and ocular manifestations following scorpion stings.

Aron reports a case in which the patient crushed a garden spider with a

hammer, the juice entering the right eye. This was followed by a very painful severe conjunctivitis, defects of the corneal epithelium and chemosis.

Experimental studies on the effects of bee stings

Langer in his studies of bee poison from honey bees found that subconjunctival injections or the instillation of bee poison into the conjunctival sac had the same effect as a direct sting of the conjunctiva.

Huwald performed experiments on forty-five rabbit eyes; whether the sting was left in or not the course was the same. In these experiments the eyes were enucleated from two hours to seventy-five days after injury. The immediate effect of the sting was a violent general inflammation with a mucopurulent secretion from the conjunctiva. These signs were followed by pallor and soon an opacity of the cornea; then suppurative infiltration and epithelial destruction at the site of sting wound, hypopyon and finally a whitish spot resembling anterior capsular cataract in the pupillary region developed. In two to three weeks the inflammation subsided, the cornea cleared up more or less, the sting became visible and although not resorbed caused no further reaction. The anterior capsular spot remained unchanged. Huwald says further that the necrosing action of the poison was seen in the destruction of substance in the cornea and the secondary endothelial destruction of Descemet's membrane. There was a marked chemotaxis with abundant leucocytic immigration. The iris reacted with miosis lasting for minutes or hours, often with an enormous hyperemia and numerous blood extravasations. The poison was diluted in the aqueous humor, so that in the cornea the poison was much stronger. In two cases a thick, fibrinopurulent exudate was seen on the iris, no doubt due to the local action of the poison.

In two-thirds of Huwald's cases the lens was involved. In one-fourth of the cases there was a sharply defined, whitish opacity on the anterior margin. There seemed to be no parallelism between the severity of the keratitis and the degree of lens changes. The latter occurred only when the cornea had been completely perforated by the sting, i.e., when poison was injected directly into the aqueous humor.

During the first hours after the sting there was a fine, subcapsular opacity in the pupillary region. This opacity usually became more extensive and denser during the first two days, but it remained limited to the anterior cortical layer and subsided rendering more and more visible the small circumscribed whitish opacity in the center. This was usually round, in two cases it was linear, and in one case there was a concentric ring about the anterior pole.

Microscopically the subcapsular opacity was found by Huwald to be due to a circumscribed degeneration of the capsular epithelium. The subsequent more extensive and denser opacity was due to fluid between the capsule and the lens. The small circumscribed opacity which finally appeared was due to an irregular proliferation of the capsular epithelium.

Huwald describes the lens changes as follows: The bee poison is diffused in the aqueous humor. The iris immediately contracts leaving the lens exposed to the poison in the pupillary region, where the poison enters the capsule, necrosing the inside epithelium as well as the more superficial lens substance. The defect in the capsular epithelium admits the aqueous humor to the capsular sac, leading to destruction of the anterior cortex.

The intact epithelium at the margin of the defect begins to proliferate as soon as the aqueous humor carries off the poison. Most mitoses occur on the second or third day after the sting. The new epithelial layer of the capsule is very irregular and consists of several layers, as many as twelve. Into the fluid beneath it or into the destroyed substance of the lens it sends forth tiny, flat processes, deepest at the anterior pole. In some cases, after

weeks or months, a normal single-layered epithelium no doubt forms. In others a capsular cataract forms. Clinically the whitish spots at the anterior capsule resemble almost exactly an anterior capsular cataract. Pathologically the findings were typical in only one of the experimental cases.

The destruction of the substance of the lens is attributed to the presence of aqueous humor still containing poison. In only four of the forty-five experiments did the sting actually enter the lens. No local reaction was caused in the lens. The course of the process in the anterior cortex and in the pupillary region was not influenced by the presence of the sting in the lens.

Koyanagi in his experiments obtained results which on the whole agreed with those of Huwald. Koyanagi described the process as follows: An acute suppurative inflammation of the conjunctiva, not infrequently leading to necrosis, develops almost without exception shortly after the injury, even though the sting is in the cornea. This conjunctival affection is apparently due to the direct action of the poison injected into the anterior chamber or cornea, which diffuses into the neighboring tissues fairly rapidly owing to its easy solubility in the tissue fluids.

In Koyanagi's experiments, in which two or more stings were made in the cornea, the miosis was not so marked and was usually quite temporary, lasting five to fifteen minutes, rarely longer. On the other hand he was struck by the fact that in most cases, thirty minutes after the last sting, the pupil dilated markedly, sometimes even to maximum dilatation. This mydriasis did not react to repeated eserin instillations, and, in spite of the irritable condition of the cornea and the hypopyon, remained unchanged during the further course of the process.

Microscopic examination of Koyanagi's cases showed almost regularly a necrotic change of the iris, evidently due to the direct action of the poison. The sphincter muscle especially seemed very markedly sympathetically involved. In most cases it showed a hyaline degeneration so that neither morphologically nor tinctorially could it be distinguished from the surrounding stroma of the iris. In some cases only a small part of the sphincter muscle was left. This remaining portion was swollen. The cell nuclei were usually atrophied and deformed. That such a degeneration of the sphincter muscle must lead to marked mydriasis can readily be understood.

Another type of mydriasis was observed by Koyanagi. In his case 5, one of bee sting of the cornea, a marked miosis occurred shortly after the sting and persisted unchanged for some hours. The pupil then gradually dilated. For the first three days it remained narrower than that of the normal eye. On the seventh day when the inflammatory symptoms of the conjunctiva and cornea had subsided, a marked mydriasis developed, not reacting to repeated instillation of eserin. Microscopic examination revealed an abnormal proliferation of the endothelium of Descemet's membrane, extending to the chamber angle and anterior surface of the iris. In this way the iris became, at several points but especially at its root, adherent to the posterior corneal surface; this late mydriasis was thus due to traction on the iris toward the chamber angle by the adhesions.

In explaining the development of glaucoma after bee sting, Koyanagi believes that an abnormal proliferation of the endothelium in the chamber angle plays a significant rôle.

In glaucoma therefore it may be assumed that the process is about as follows: The poison injected into the anterior chamber or cornea leads first to a necrosis of the corneal endothelium with resulting marked mydriasis from injury of the sphincter. Then follows an abnormal proliferation of the endothelium extending to the chamber angle and anterior surface of the iris. The iris, being much injured by the poison, adheres to the cornea in its periphery, the chamber angle being thus completely closed. The final outcome of such a process is increased

pressure or secondary glaucoma. Experimentally, however, glaucoma was never produced.

Iris depigmentation was very striking even clinically in many of the cases. Pathologically there was a definite degeneration of the spindle-shaped chromatophores in the anterior layer of the iris. The decomposed pigment was taken up partly by the spindle cells or round cells in the stroma. The retinal pavement epithelium of the iris and ciliary body was more or less sympathetically involved in a number of cases. It seems possible therefore, that bee poison has a local action on the iris causing a degenerative change in the chromatophores and sphincter muscle without preliminary inflammatory symptoms.

Bee poison is more toxic in winter than in spring, but the age and breed of the bee has also some influence.

Primary injury to the eye from bee stings

Langer states that the local action of bee poison consists in necrosis with resulting round cell infiltration, edema and hyperemia of the surrounding tissues, and that the general action seems nearly related to the poison of vipers and crotalids.

Hilbert reports a case of bee sting of the upper lid in a female sixty-three years of age; when seen the following day the patient was weak and ill, suffering from diarrhea and loss of appetite. Examination showed that both lids of the affected eye were swollen and bluish red in color. The sting was removed from the upper lid. There was conjunctival and ciliary injection. The aqueous humor was cloudy (slight hypopyon). The iris of the healthy eye was blue and in the affected eye looked greenish. The pupil was contracted, but it dilated about ten minutes after repeated instillations of atropin; no synechias were found. The patient's skin was cold and clammy and the heart action was poor, the pulse being fifty-two and threadlike. This case presented a serous iritis with considerable involvement of the nervous system. The eye did not return to normal until the end of the fourth week.

Rognette reports a case in which the patient was stung several times in the lids and about the head. Fever, delirium and death followed in a few days.

Barczinski saw a case of bee sting of the cornea. There was diffuse parenchymatous opacity. The tip of the sting was removed. Six or eight weeks later iritis and hypopyon developed. There was a flake of pus on the posterior wall of the cornea. The cornea was eroded at this point, and perforation occurred, followed by healing.

Krieg has described the condition of the left eye of a man sixty years old who five weeks previously was stung in the cornea by a bee. The eye showed hypertrophic proliferation of the conjunctiva and the cornea was coated so that no idea of the condition of the iris and pupil could be obtained. Palpation of the globe unexpectedly produced extraction of the sting. Four weeks later the cornea was transparent enough to show the immovable, greatly dilated pupil and a lymphatic exudate in the anterior chamber extending to its margin. Several more weeks elapsed before resorption was complete. The following changes persisted for three years: (1) The iris, which was dirty blue on the right side, was a very clear blue on the affected side. (2) Affected pupil remained dilated and did not respond to light. (3) The pupillary margin was displaced outward and downward. (4) Before the accident the patient was presbyopic in both eyes, now he can read the finest type with the affected eye.

Nonay reports a case of primary lens abscess following a bee sting. There was no iris injury. Extraction of the lens was thought inadvisable.

Lundsgaard examined a man fifty-seven years of age, who, five days previously, had been stung in the ciliary body of the left eye by a bee. Examination July 29th showed the eyelids to be normal, but there was ciliary injection of the eyeball. About 1 mm. temporally from the corneal limbus

there was a grayish, rounded patch about the size of a pin head with a white punctiform area in the center. Attempted removal of the bee sting with Horner's chisel was unsuccessful. The cornea was grayish white, so that the iris could scarcely be distinguished. Tension normal. Vision—counted fingers at nearest distance. By September third the injection had subsided, the pupils were equal and the vision in the affected eye was 5/30 with a —2.50 sphere. The injured side of the iris, which had previously been a clear dark brown, was now pale blue, a little brown pigment remaining. October fifth, the pupils were equal, pupil of injured eye being slightly oval in the vertical direction. October sixteenth, cornea clear. The ophthalmoscope revealed normal conditions. The depigmentation persisted. About six months later the iris began to resume its normal color. In two years the difference in color was no longer striking. The affected eye also showed a decrease in the myopia.

Huwald reports the case of a man thirty-five years of age who was stung in the cornea of the left eye October 7, 1902. October 8, 1902, lids swollen and red. Palpebral conjunctiva markedly injected. Slight mucopurulent secretion, globe showing bulbar and ciliary injection. Cornea very pale; somewhat temporally from the center (occupied by a longish oval loss of epithelium about the size of a pinhead) was a thick, yellowish gray infiltration of the somewhat protruding base. Hypopyon in the anterior chamber 3 mm. in height. In spite of atropin the pupil was not even medium wide. Atropin and hot applications caused the inflammation to subside gradually in the next fourteen days.

On the eighteenth day the left eye showed slight bulbar injection, the cornea being slightly pale. A hairlike foreign body could be seen which was probably the remains of the bee sting. The hypopyon had disappeared. The pupil had almost maximal width in all directions except temporally, no synechia being present. In the center of the anterior lens capsule there was a grayish white spot about the size of one-half of a lentil. This had hitherto been invisible owing to the opacity of the cornea. No changes in the fundus. Vision of left eye was counting of fingers at two to three meters.

November 9, 1902, patient discharged to return for ambulatory treatment. Five months later left eye showed no inflammation. Cornea shiny and clear. A little temporally from the center a longish, oval, still fairly dense, superficial opacity; in the middle of the anterior portion a brown foreign body. In the anterior lens capsule a sharply circumscribed, whitish gray spot looking very much like an anterior capsular cataract. From the position of the sting in the cornea it seemed improbable that the sting could have injured the lens in the pupillary region causing the capsular cataract there. Vision with and without glasses was 5/20. After one and a half years the vision was about the same.

According to Koyanagi, glaucoma very rarely develops after sting of the cornea, although Lundy in 1886, Mizon in 1906, and Komioto in 1913 each reported such a case.

Unfortunately I was unable to obtain Joachim's thesis on bee stings of the cornea.

Secondary injury to the cornea from bee sting

Dorff states that most cases in the literature deal with direct, primary bee-sting injuries of the cornea. He has recently seen several cases in which the sting had remained in the lid for long periods (up to seven years) without causing any reaction and then produced a secondary injury of the cornea. He reports three cases in detail. In case 1, a man, sixty-seven years old, had been stung three weeks previously by a bee. In case 2, a farmer, forty-nine years of age, had been stung seven years previously by a bee or a wasp. In case 3, a woman, forty years of age, had been stung eight months previously by a bee. In none of these three cases had the sting passed through the

lid. There was a reaction to the poison lasting for a few days, after which the swelling subsided as the poison became diluted with the tissue fluid. The fact that the sting itself was not absorbed by the tissue fluid was due to its chitin-like composition. The sting gradually worked its way through the lid, producing the corneal injury. The diagnosis was made by everting the lid and examining with a microscope.

Orendorff saw a carpenter of twenty-five years who, three months previously, had been stung in the upper lid by a honeybee. The patient had a conjunctivitis and later developed a keratoiritis, at which time the tip of a bee sting was found at about the center of the tarsal conjunctiva. After the sting was pulled out the patient made a complete recovery.

Case report

Miss E. P., white, aged twenty years, student, referred by Dr. G. G. Howery, October 4, 1927. She gave the following history: During the early part of August, 1926, her brother, while robbing beehives, had been attacked by the bees and had rushed into the house where the patient was at work. One of the bees had stung the patient in the cornea of the left eye. Since the accident, the left eye had been a constant source of pain and irritation, the eye having been inflamed and having teared more or less constantly, so much so that the patient requested that the eye be enucleated to relieve her symptoms.

Examination: Right eye was negative. Left eye showed moderate injection of the bulbar conjunctiva. The cornea had an opacity about 2 mm. in diameter at 7 o'clock position and 3 mm. internal to the limbus. The pupil of the left eye was two-thirds dilated and did not react to light. Tension normal. Vision with a +0.50 sphere combined with a +1.50 cylinder axis 105° = 6/9. Biomiscroscope showed two linear, golden brown structures lying obliquely in the substantia propria. The tip of one was in Descemet's membrane and the tip of the other was just within the anterior chamber. Surrounding the bee stings and anterior to them was an opaque area about 2 mm. in diameter. No changes could be seen in the iris, the anterior capsule or the lens proper.

Operations: The operations, four in number, were all performed under local anesthesia, with two percent butyn and 1 to 1,000 adrenalin. October 6, 1927, one-half of the most superficial bee sting was removed by the use of a cataract knife and a curette. As the anterior chamber was lost, I was compelled to abandon for the time being further attempts to remove the remaining one and one-half bee stings. October 14, 1927, I again attempted to remove them, but, before being able to get either sting, the anterior chamber was again lost and further procedure abandoned. October 27, 1927, the remaining portion of the one sting was removed; upon attempting the removal of the deeper bee sting the anterior chamber was lost and the eye again closed.

In conversation with Drs. William Zentmayer and Edward Jackson, both advised me that probably the best procedure would be to enter a keratome behind the bee sting and thus protect the lens and support the cornea after losing the anterior chamber, which we felt sure would occur as the tip of the remaining bee sting was in the anterior chamber.

December 1, 1927, a keratome was entered into the anterior chamber behind the bee sting; with a knife-needle and a small curette the bee sting was exposed, and, although the anterior chamber was lost, I had little difficulty in removing the bee sting and no fear of injuring the lens. The bee sting was removed in toto. Inasmuch as a small opening had been made through the cornea, the anterior chamber did not reform for about five days, leaving a small scar in the cornea and two very fine, threadlike anterior synechias, which did not interfere with the shape nor action of the pupil.

To prevent, as far as possible, a permanent fistula of the cornea or an an-

terior chamber cyst, no attempt was made by the use of atropin or eserin to loosen the anterior synechias. The use of a conjunctival flap following the last operation might have fastened the formation of the anterior chamber and thereby prevented the formation of the anterior synechias. Had the anterior chamber formed rapidly, atropin could have been used early.

Final examination of patient: Examination of patient March 20, 1930: Vision without glasses O.D. 6/4, O.S. 6/4, Near point without glasses number 0.50 m. type = 11 cm. in each eye Muscle balance within normal limits. Pupils round and equal, and react to light and accommodation, directly and consensually. There has been no change in the color of the iris in the affected eye. The left eye shows a slight opacity of the cornea and two very fine anterior synechias which in no way interfere with the action of the pupil.

Summary

1. Bee-stings of the eye cause both a marked local and general reaction.

2. Local reactions include conjunctivitis, keratitis, hypopyon, iritis, atrophy of the iris, anterior capsular cataract, abscess of lens, perforation of globe, glaucoma and change in refraction.

3. The general reactions are diarrhea, loss of appetite, disturbance of heart action, fever, delirium and at times death.

4. The eye may be injured primarily or may be affected months or years later by a bee sting's working its way through the lid and then injuring the globe.

5. Retention of bee stings in the cornea evidently does at times cause irritation, as shown in the case reported, even though the rabbits experimented upon by Huwald showed no ill effects from retention of stings.

6. Bee stings are probably never absorbed by the tissue, one of Dorff's patients having retained a bee sting unchanged for seven years.

7. Flury believes that the active substance in bee poison constitutes a transition between protein-free sapotoxin of animal origin, such as crotaloxin and ophiotoxin of snake poison, on the one hand, and the poisons of the cantharid group on the other.

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THE BACTERIOLOGICAL AND IMMUNOLOGICAL ASPECTS OF IRITIS

With special reference to its relationship to bacterial allergy

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It is urged that advantage should be taken of every available opportunity for bacteriological and experimental study of iris tissue and aqueous humor from cases of iritis which may be due to focal infection. Emphasis is laid on the possibility that iritis and related conditions may be due to soluble exotoxins derived from streptococci or other bacteria in distant foci of infection. From the Research Institute of Cutaneous Medicine, Philadelphia. Read before the Association for Research in Ophthalmology, June 24, 1930. Dr. Kolmer is professor of pathology and bacteriology in the Graduate School of Medicine of the University of Pennsylvania.

It is exceedingly difficult to discuss the bacteriology of iritis in accurate terms, because of a scarcity of acceptable data due to the fact that enucleated eyes and bits of iris removed by operation are only occasionally subjected to thorough study. From this standpoint it is greatly to be hoped that our larger ophthalmological clinics will organize more systematic investigations in this disease, and in this connection it may be suggested that all bits of iris removed at operation should be cultured in an enriched broth medium even though showing no demonstrable evidences of iritis; that aqueous humor should be aspirated under aseptic conditions from at least some cases of iritis, and subjected to careful bacteriological examination; and that special efforts should be made, thoroughly and routinely, to investigate enucleated eyes and to secure immediately after death the eyes of as many individuals with iritis and iridocyclitis as possible, for very carefully planned bacteriological and histological investigation. In this manner the reliable and acceptable data so urgently required will be gradually accumulated.

Iritis and iridocyclitis of exogenous origin due to accidental injury of the eyes or to operative procedures, with or without infection, require no special discussion. The former are usually due to staphylococci, streptococci, or pneumococci, and the route and mechanism of infection are both simple and readily understood.

But iritis and iridocyclitis of endogenous origin present a subject of great clinical and bacteriological interest, especially as to the chronic recurrent types. Tuberculous, syphilitic, and even gonococcic iritis may be stated to have been fairly well worked out, although some factors concerning the nature and mechanism of infection still require elucidation. But those much more common cases of chronic iritis with recurring acute exacerbations, believed to be associated with focal infection, constitute a bugbear for every clinical ophthalmologist; and it is these cases which merit intensive investigation and offer the main interest of this communication.

I believe that all types of endogenous iritis are due directly or indirectly to microorganisms or their products. By "directly" reference is made to the presence of microorganisms in the iris; by "indirectly" to the activities of bacterial toxins in the iris or to acquired allergic sensitization of the ocular tissue to bacterial products produced in foci of infection situated elsewhere in the body.

In my opinion so-called "gouty" or "uratic" iritis is primarily due to secondary uratic deposits similar to those of chronic arthritis. Likewise in the iritis of diabetes mellitus it would appear that infection is the primary factor, but is associated with the peculiar reduction in immunological resistance and with the vascular sclerosis of this disease. The same may be stated in relation to the "flare-ups" of iritis during menstruation, in which it would appear reasonable to assume the presence of

latent infection activated by the lowered general resistance which accompanies this state in some individuals.

In tuberculous iritis the etiological evidence would appear to be clear, since tubercle bacilli have been demonstrated in the iris by histological methods and animal inoculation.

Spirocheta pallida has been demonstrated, at least in experimentally produced syphilis of the lower animals, while the results of therapeutic tests in syphilitic iritis of human beings leave no reasonable doubt of actual local infection with this organism, although there is the possibility that a spirochetal toxin produced in other foci of syphilitic infection may be present and may cause the iritis.

To the best of my knowledge the gonococcus has not been directly cultivated from the iris, so that, while there is no doubt of the occurrence of gonococcic iritis, yet the question of whether or not it is due to actual presence of the organism itself or to its toxins is still uncertain and will be discussed shortly in more detail. The organism is so difficult to cultivate when but few are present that I am well prepared to expect negative or sterile cultures of iris and of aqueous humor without necessarily accepting such results as proving the absence of the germ itself.

The meningococcus appears to have been satisfactorily demonstrated in the aqueous humor of the iritis and iridocyclitis sometimes complicating epidemic cerebrospinal meningitis, but the same can not be stated of the typhoid bacillus in the iridocyclitis of typhoid fever or of the pneumococcus in the iridocyclitis of pneumonia.

Spirillum recurrentis (Borrelia recurrentis) has been found in some cases of iritis and especially in syphilitic individuals undergoing "fever therapy" by inoculation with this organism, but to the best of my knowledge the malarial parasites themselves have not as yet been demonstrated locally in the iritis of malarial fever and nothing is known of the bacteriology of those rare instances of iritis associated with mumps, influenza, and Weil's disease.

But what about the bacteriology of those much more important instances of recurring iritis commonly associated with chronic rheumatic arthritis and other types of known or suspected focal infection? Available evidence strongly indicates that these are streptococcus infections. It may be that staphylococci are occasionally responsible, but organisms of the streptococcus-pneumococcus groups certainly command most interest and attention and I am of the opinion that all such cases may be safely regarded as due to streptococcic infection unless proven otherwise; although the evidence is still largely inferential rather than direct in so far as finding streptococci or staphylococci in cultures of the iris or the aqueous humor are concerned.

Indeed, in so far as my own limited experience and opportunities for cultural tests are concerned, the results have been usually negative or sterile, but I hasten to add that, while cultures were made in Rosenow's brain-broth medium under partial oxygen tension (admirably suited for the cultivation of streptococci), yet the amounts of material cultured have been necessarily quite small, with excellent chances of sterile results on the mere basis of this technical factor.

That streptococci injected intravenously into rabbits in large amounts from freshly isolated broth cultures sometimes produce iritis may be said to be proved, although the instances of success in my own experience have been very small among a large number of attempts. Whether or not this constitutes evidence of an acquired selective or specific affinity of the germ for this organ is a different matter, shortly to be discussed, but relatively unimportant at this moment. That chronic recurrent iritis is sometimes due to proved instances of focal infection caused by streptococci is suggested by the relief and even cure of some cases following the surgical drainage or removal of foci. But in a goodly number of cases of iritis there are no discoverable areas of focal infection by our present methods of investigation.

In my opinion the etiological problems of this type of iritis are identical with those associated with the etiology of acute rheumatic fever and chronic arthritis.

I believe that iritis and arthritis are streptococcic infections, but doubt if a specific streptococcus is concerned in either; rather I entertain the opinion that various streptococci may represent the etiological factors. At least I have been able to produce iritis in rabbits with cultures of streptococci recovered from individuals without demonstrable iritis or clinical evidence of focal infection.

It may be that streptococci growing in abscessed teeth, the tonsils, the prostate gland, the intestinal tract, or elsewhere may acquire a selective or specific affinity for the iris as stated by Rosenow[1] and supported by his own experiments and those of others with rabbits, but the evidence is not yet generally accepted. Nor is it essential in the etiology of iritis, since localization of streptococci in this organ may be influenced more by congenital predisposition, unsuspected trauma, bacterial embolism, anatomical conditions concerning the arterial supply, and like factors, without involving the question of elective or specific tissue localization.

Of equal importance are other moot questions of how the iris and uveal tract become infected and as to the relationship of focal infection to the process.

In the first place is the iritis due to the presence of streptococci or staphylococci themselves or to their soluble exotoxins?

It would appear readily possible for the organisms to be transported by the blood stream from a distant focus in the teeth, in the tonsils, or elsewhere. But actually to find the germ in the blood by culture would be purely accidental and probably the reward only of a large number of cultures of large amounts of blood in individual cases. We have, however, reasons for believing that bacteria may be temporarily present in the blood for brief periods of time, probably measurable only in minutes or hours, without clinical evidences of blood stream infection. This would constitute "bacteremia," and would imply the mere presence of organisms in the blood without their proliferation, because of a sufficient bacteriostatic activity of the blood associated with low virulence of the organism. When, however, the organisms are of enhanced virulence or the natural bacteriostatic activity of the blood is reduced as in diabetes and other states, proliferation of the germs in the blood may occur, constituting what may be designated as "septicemia" for want of a better term. Once in the blood they could easily localize in the iris, especially if favored by trauma, but one wonders why iritis is so uncommon in streptococcic and staphylococcic septicemias demonstrated by positive blood cultures. Indeed the rarity of this complication in my experience has made me wonder if after all there may not be more to Rosenow's theory of acquired selective affinity of streptococci for the iris and other organs of the body than I am inclined to grant at present.

But the possibility of exotoxins of streptococci produced in distant foci of infection being responsible for chronic recurring iritis rather than the organisms themselves is certainly worthy of very close study. More and more attention is being given to the toxins of streptococci, pneumococci, staphylococci, and other pathogenic organisms. Indeed I think it may be stated as now proved that most strains of streptococci and staphylococci are producers of soluble exotoxins. It is also quite probable, although not proved, that virulent gonococci may likewise produce small amounts of such toxin and that gonococcic iritis is due to the activity of such a toxin or to acquired allergic sensitization of the iris to it.

If these toxins caused iritis, cultures of the iris and of exudates in the chambers of the eye would be sterile, and the very frequency of such a result lends support to the idea. Certainly this would appear to be a subject worthy of further investigation, employing rabbits or monkeys inoculated intravenously with repeated doses of the filtrates

(toxins) of streptococci from different sources to determine whether iritis may be experimentally produced. Into such experiments the question of bacterial embolism would not enter, and if positive results were obtained we should have direct evidence to indicate the possibility of toxins alone producing iritis, and thus greatly to strengthen the theory of acquired specific tissue affinity.

Personally I am greatly inclined to place much emphasis upon the possible rôle of such toxins in the production of iritis, as I am in relation to arthritis. I am also very favorably impressed with the work of Swift, Derick, and Hitchcock[2] indicating the possibility that the joint changes in rheumatic fever may be due to acquired allergic sensitization of these tissues to various streptococci and their toxins, arising in foci of chronic infection. If this theory is applicable to some if not to most cases of chronic recurring iritis and iridocyclitis, as I believe it is, the tissues of the iris acquire allergic sensitization to streptococci and their toxins and the lesions are due to allergic shock reactions. This is also a splendid field for research in ophthalmological clinics. Skin tests with streptococci and their toxins should be conducted in cases of iritis, as well as experiments employing rabbits much after the methods developed by Swift and his associates. Indeed the frequency with which "flare-ups" or focal reactions in iritis may occur upon the subcutaneous injection of vaccines of streptococci from foci of infection like the teeth and tonsils, or after surgical removal of such foci, suggests this possibility as well as lending further evidence of a convincing character toward the etiological relationship of focal infection to chronic iritis.

That chronic focal infection bears an etiological relationship to iritis would appear to have been well established by Irons and Brown[3] and many other ophthalmologists, although as previously stated, in not a few patients with the disease very careful clinical, bacteriological, and roentgenological examinations have failed to reveal foci of infection. Abscessed teeth, infected tonsils, and intestinal infections have been of most importance in my experience, while infection of the nasal accessory sinuses has so far proved of much less importance.

In so far as tuberculous, syphilitic, and gonorrheal iritis are concerned there is little or no question, as in these types the presence of infection in other parts of the body from which organisms or their toxins are believed to spring producing iritis is generally accepted.

But the frequency with which surgical removal or drainage of discoverable or suspected foci of streptococcic or staphylococcic infection has failed to relieve or cure chronic recurrent iritis of the common type has raised in the minds of not a few physicians a big question whether focal infection possesses the importance we think it may have. However, it is always to be kept in mind that the infection or allergic sensitization may be so well established in the iris as to make this focus independent of the primary focus or foci, and that removal of the latter may be indeed an example of "locking the stable after the horse is stolen." Furthermore, one never fails to be impressed with the fact that foci unbelievably small and apparently insignificant may in fact be primarily responsible, so that failure to find them even by experienced specialists does not necessarily exclude the probability of their presence.

In conclusion I would offer the advice of planning the general or systemic treatment of chronic recurrent iritis along the present lines of treatment of chronic arthritis. In my opinion this should always include a minute search for possible foci of infection by enlisting the services of specialists. If foci are discovered and surgically removed I strongly advise very careful bacteriological examination of the material, especially of abscessed teeth and tonsils, with special reference to streptococci, along with the careful preparation and administration of autogenous vaccines. In reference to the latter I believe that better results will be obtained by using vaccines of streptococcic and staphylo-

coccic toxins (filtrates) instead of the usual heat-killed products. At least the former have yielded me much better results during the past two years, although it is necessary to start with very small doses gradually and cautiously increased at three-day to seven-day intervals and given over rather long periods of time covering a total of at least twelve or more injections. This would appear to be the most logical and the best method available at present for raising the opsonic and other antibody contents of the blood to a therapeutic threshold for the gradual removal of infection or desensitization of the iris, following surgical removal or drainage of discoverable foci of infection.

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[1] Rosenow, E. C. Iritis and other ocular lesions on intravenous injection of streptococci. Jour. Infect. Dis., 1915, v. 17, p. 403.
[2] Swift, H. F., Derick, C. L., and Hitchcock, C. H. Bacterial allergy (hyperergy) to hemolytic streptococci in its relation to rheumatic fever, Jour. Amer. Med. Assoc., 1928, v. 90, p. 906. (Also gives references to their earlier investigations.)
[3] Irons, E. E., and Brown, E. V. L. The etiology of iritis. Jour. Amer. Med. Assoc., 1923, v. 81, p. 1770.

Discussion: DR. KNAPP: How do you explain the often remarkably rapid improvement in an iritis after removal of a focus of infection even though the condition has been in existence for some time?

DR. KOLMER: The only explanation that I would offer for a phenomenon of that kind is that the iritis is due to a continuous process of infection without well established secondary infection in the iris, so that prompt drainage of the primary focus is followed by rather prompt recovery of the iris.

While this question has proved a very disturbing one to students of iritis, the occurrence of a prompt recovery of that sort lends support to the idea that iritis may be due to the presence and the activity of a toxin rather than to the streptococcus itself.

DR. VERHOFF: If you assume that a toxin causes iritis do you assume that the toxin is in the blood and equally distributed? And in view of this would you not expect that there would be a very marked systemic reaction present, sufficient to irritate the iris? Or do you assume that the toxins accumulate in the eye for some reasons?

DR. KOLMER: I assume that the toxins accumulate in the iris. We have among the bacterial toxins some very striking instances of selective tissue affinity, although not of the acquired type. I refer for instance to the presence of the toxin of the tetanus bacillus in the blood to such a degree that when we inject the serum of such an individual into a mouse we produce tetanus intoxication and yet the toxin circulating in the blood of the patient appears to have no effect except upon the anterior horn cells of the spinal cord.

We may also have large amounts of diphtheria toxin in the blood without demonstrable evidence of a toxinemia except for its elective localization on the ganglia of the heart. So we see among the toxins of bacteria some of the most striking evidences of specific tissue affinity. This however is not acquired selective tissue affinity and I think there is a distinction to be made between the two.

DR. KNAPP: Dr. Schnabel wishes to ask Dr. Kolmer: What importance do you attach to the intradermal use of tuberculin as a diagnostic procedure?

DR. KOLMER: I personally entertain a very high opinion of the intradermal tuberculin test for the detection of tuberculosis anywhere in the body, but not in special relationship to the eye.

I think the intradermal tuberculin test has proved a very high degree of sensitiveness and specificity for the presence of tuberculous or previous tuberculous infection anywhere in the body. If the eye is involved and if the matter of a focal reaction will not be of any special danger to the patient I prefer the subcutaneous test.

It was stated this morning that the intramuscular injection of milk and other known specific protein agents can produce a similar focal reaction. To this I agree but my experience has been that the amount of tuberculin that will produce a focal reaction when given subcutaneously is very much smaller than the amount of milk required to produce the reaction.

CHAIRMAN WILMER: Are there any more questions?

DR. DERBY: Mr. Chairman, may we ask Dr. Finnoff whether that has also been his experience?

DR. FINNOFF: Yes, that has been our experience.

ENDOGENOUS INFECTIONS IN THE ETIOLOGY OF ACUTE IRITIS

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From a group of cases of uveitis some conclusions are drawn as to the probable bearing of focal infection upon the ocular disturbance. While many inflammatory attacks in the uveal tract subside promptly after elimination of endogenous infections, some patients have recurrent attacks in spite of such action, and some similar attacks subside without attention to focal infections, even when these are known to exist. Read before the Association for Research in Ophthalmology, June 24, 1930.

If a symposium on the etiology of acute iritis had been undertaken twenty years ago, it is more than likely that some of the titles of its several essays would have read much as they do in this program today. Presumably there would have been a presentation to cover the literature on the etiology of acute iritis, another one concerning syphilis and acute iritis, still another one on tuberculosis in the same relationship, and finally one paper to serve as a critique of the whole subject under discussion. It is more probable that the subject "Immunology and bacteriology in the etiology of acute iritis" would not have appeared on the program and it is quite as certain that the discussion of endogenous infections would have had no titled position in such a symposium. On the other hand, rheumatism, rheumatic and constitutional diatheses, gout, scrofula, toxemia and autotoxemia, cachexia, and other topics would have occupied much time in discussion as etiological possibilities for acute iritis.

In 1907 the Wills Hospital Ophthalmic Society held a symposium on iritis,[1] with no specification as to acuity or chronicity. The program was as follows:

"Etiology of iritis," by William Zentmayer, M.D.

"Iritis in general disease," by Burton Chance, M.D.

"Symptoms of iritis," by Samuel D. Risley, M.D.

"The treatment of iritis," by S. Lewis Ziegler, M.D.

In one of these presentations[2] reference is made to the suggestion by Campbell in the Lancet of July 22, 1905, "that iritis might be caused by infection from the mouth. His patients had pyoalveolaris. The iritis was cured when the oral cavity became aseptic."

In the symposium no suggestion is made for the elimination of an extraocular bodily infection as a practice in the treatment of iritis. There is a highly prophetic note in this quoted paragraph[3]: "As might be expected, those diseases dependent upon the evolution of microorganisms within the body are likely to produce disorders in such highly vascular structures as the iris and ciliary body; consequently we may assume that all cases of iritis and iridocyclitis not dependent upon traumatism have their causative basis in general toxemia." By one of the essayists[4] syphilis and rheumatism were credited as being responsible for eighty-five percent of all cases of iritis. It was also suggested that, "besides syphilis and rheumatism, gout, tuberculosis, gonorrhea, diabetes, nephritis, malaria, some infectious fevers, anemia, autointoxication, sinusitis, and in distinct classes trauma and sympathetic inflammation, adolescence and senility might be causes for iritis".

The omission of many of these causes of iritis in the present discussion and the appearance of at least two new titles in the symposium indicate a changed viewpoint for the etiology of inflammatory lesions generally and more particularly for the mechanism of production of iritis. The efforts of many laboratory workers and the cooperation of many clinicians the world over during these twenty years or more have contributed to the new story of infection and immunity.

It is gratifying to know that contri-

butions from American sources have played an important rôle in changing our conceptions concerning the production of primary and secondary inflammatory lesions in the body. This is especially true for the field of focal infections. If, before Billings[5] and his coworkers emphasized the possibility, it was appreciated that infected tissue in some part of the body (endogenous) might in some way be responsible for a lesion in a nonadjacent portion of the body, then at least this was not stressed, well established, nor acted upon therapeutically. Much credit is due these Americans for the emphasis they placed on the rôle of focal infections in disease.

Ophthalmologists generally must be familiar with the work of Rosenow[6], who showed that strains of streptococci can be carried in the blood stream from infected teeth, tonsils, sinuses, and other sites, and that they may be responsible for acute and chronic iritis and iridocyclitis. Ophthalmologists must also be familiar with the work of Brown and Irons[7, 8, 9, 10] among these early students of focal infection. The writer appreciates that this communication is addressed to a group of men whose daily work frequently concerns the question of endogenous infections and diseases of the eye. Ophthalmologists are therefore familiar with all the phases of the focal infection idea and it is not too much to say that this group of specialists have played a large part in establishing the principles of focal infection.

For the purposes of this paper, it is planned to analyze twenty patients' records made in the capacity of consulting internist. The ocular diagnoses (table 1) are those given on the consultation requests and were intended to convey only an approximate idea of the presenting eye lesion. For consulting purposes this is all that would seem to be necessary.

While acute iritis is the particular objective in this symposium, nevertheless it seems justifiable to include in the group patients with inflammatory lesions of a part or the whole of the uveal tract. The anatomical inclusion of the iris in the uvea makes it difficult to believe that iritis has its own etiological picture. For the same reason it would seem to an internist to be rather unusual for inflammation to limit itself solely to the iris. The duration of the eye lesion was also only approximately indicated on the consultation requests. The information thus conveyed allowed at the best for a division of the patients into two groups.

Table 1 includes those with initial attacks, and a combined group of those who were experiencing recurrences, those with subacute attacks or those with visual difficulties consequent upon the sequelæ of acute attacks. In the former group there were six patients and in the latter there were fourteen patients. Of the first group one patient was studied as early as the seventh day after the onset of his eye lesion, while of the latter number one patient was studied during one of his frequent recurrences sixteen years after his initial experience.

Table 1

Patients' records analyzed	20
Ocular diagnoses	
Iritis	7
Uveitis	6
Iridocyclitis	3
Choroiditis	4
First attack patients	6
Recurrent, subacute and visual difficulties from sequelæ of acute attacks	14
Male 10, female 10	
Ages 18 to 61 years	
Average age men 40+	
Average age women 29+	

A majority of this entire group were extensively and carefully studied before they came for an internist opinion. One gets the impression, which is not shown in this analysis, but is nevertheless evident, that the inflammatory uveal tract patients are naturally and logically studied by the ophthalmologist, laryngologist, rhinologist, otologist, urologist, and clinical pathologist before he reaches the internist. All this shows that the principles of endogenous infection are well appreciated by all those who are concerned in the care of these patients, but this practice leaves

some difficult problems for the internist to solve.

Analysis of age distribution would seem to indicate that such inflammatory lesions of the eye occur largely in the first half of life, which is in keeping with the age incidence of infectious processes generally. They can occur later in life, as is shown by the fact that one of these patients had his first attack at sixty-one years. There was an equal distribution in numbers between the sexes, but the women were somewhat younger on an average than the men. Rheumatic fever occurs more frequently in women. The equal sex distribution in this series might suggest that their eye lesions have no relationship to real rheumatic fever with its uncertain though probable streptococcic origin. The incidence of acute iritis during a rheumatic fever attack is a possibility but it must be a rare event.

The past medical history of these patients antedating the eye lesions shows a rich possibility for endogenous infections. (Table 2.) It is rather difficult to estimate these possibilities numerically, but a total of the figures as set down amounts to thirty-five in twenty patients. It may or may not be justifiable to assume that the history of tonsillectomy means tonsillar infection, that a sinus operation means a preceding sinus infection, and that extracted teeth mean an antedating dental infection. The elimination of infected sites is a general practice without any certain knowledge that such foci are really infected or whether they are real portals of entry for infection.

Table 2

Past medical history:	
Antecedent lesions:	
Frequent sore throats and colds	5
Tonsillectomy	4
Partial dental extractions	11
Edentulous	2
Sinusitis	4
Gonorrhea	3
Genital lesions (luetic)	3
Pneumonia and empyema	1
Typhoid fever	1
Arthritis	1
Miscarriages and uterine hemorrhages (radium)	2
Vasomotor rhinitis	2
Procedures resorted to after eye lesions appeared:	
Tonsillectomy	7
Dental extractions	6
Sinus operations	3
Urethrotomy	1
Prostate massage	1
Vaccines	3
Colonic irrigations	3
Eye lesions improved after	
Tonsillectomy (immediate)	5
Dental extraction (immediate)	5
Sinus operations	1
Urethrotomy	0
Prostatic massage (immediate)	1
Vaccines	3
Colonic irrigations	0

Pepper[11] has called attention to the difference between a focus of infection and a portal of entry. The tonsil may serve as a portal of entry and yet not be a focus of infection. A sinus may be focally infected and yet not serve as a portal of entry for infection. This in a measure may explain the existence of much focal infection, in patients and the population generally, with no consequent metastatic lesions or even impairment of health. An analysis of twenty private patients' records with complaints or chief diagnoses which would seem to have no relationship to focal infection sites showed thirty-seven focal infection possibilities in the teeth and tonsils alone as compared with similar estimations of seventeen for the eye patients.

Table 3

Extraocular diagnoses (current)	
Obesity (constitutional)	2
Diabetes	1
Cardiac diagnoses	5
Gastrointestinal diagnoses	4
Lues (?)	3
Arthritis	1
Mediastinitis	1
Nonmanifest tuberculosis	7
Pulmonary tuberculosis	2
Prostatic infection	3
Sinus infection	4
Dental infection	2
Tonsils diseased (remnants or unexcised)	8

At the time of our examination, there remained ten tonsil (table 3) and dental infection lesions in the eye patients compared with seventeen for the control group. Whether or not these fig-

ures show the true state of affairs, it would seem that the control group had a much larger percentage of infected foci both before and at the time of our studies than the series of patients under consideration. Why is it that the control group did not develop acute inflammatory disease of the uveal tract? Is it that their foci of infection were not portals of entry? Were the organisms in their focal infective lesions possessed of no especial elective localization properties, or did their eyes have a satisfactory local tissue immunity?

After the eye lesions developed, but before our examination, seventeen surgical and seven nonsurgical procedures (table 2) were carried out to eliminate the endogenous infection or improve the immunity of the patients. The relief of the eye lesions generally followed tonsillectomy and dental extractions (table 2) but not invariably.

Vaccines were credited with successful use, although they were made from organisms recovered after dental extractions.

One of our twenty patients (table 2) developed his choroiditis immediately after an empyema and operation for this condition. The colon bacillus was recovered from the empyema pus. One of the patients had had an arthritis and continued to have this affliction at the time of our examination. This patient probably had both the arthritic and the iritic lesion due either to a urinary infection or to infected tonsillar remnants after tonsillectomy. Two patients reported attacks of vasomotor rhinitis. Allergic patients generally exhibit their difficulties in a multiple fashion; either they are sensitive to a number of proteins or their manifestations of allergy are resident in more than one system, e.g. respiratory and skin. If an allergic mechanism is operative for acute iritic attacks, it would seem that more of our group should have reported experiences with asthma, hay fever, urticaria, and eczema.

Forty-three current extraocular diagnoses (table 3) were made in these twenty patients, and of these thirty-one may be counted of an infectious type and twelve as noninfectious. It would seem from these figures that these patients, even at the time of the internist consultations which form the basis of this analysis, were still loaded with endogenous infectious possibilities, although much had been previously done for them in the way of treatment. (Table 2.) I think one must be impressed with the relatively few noninfectious diagnoses made.

Two patients were probably obese because of some endocrine dysfunction, although this was not proved by any easily executed test. They were therefore styled as constitutional. One patient had diabetes. One can only speculate about the possible relationship of diabetes and the endocrinopathies to these ocular lesions. Perhaps they encourage infectious processes by impairing the immunological defense of the patient, as witness the frequent occurrence of other infections in other extraocular sites in the diabetic. The diabetic patient here studied had his first ocular attack during convalescence from typhoid but he has since had a number of sinus operations followed by subsidence of choroiditis. This would make it appear that the ethmoiditis rather than the typhoid attack is to be counted as responsible for his choroiditis. His duodenal contents and feces were negative for the typhoid organism, and therefore he was not a typhoid carrier.

On physical examination our patients showed very little to criticize in their cardiovascular systems. (Table 4.)

Table 4

Heart:	
cardiovascular degenerative (hypertensive 1)	2
premature contractions	2
paroxysmal tachycardia	1
Gastrointestinal:	
mild stasis colon	2
irritable colon	2
feces examined	8
ova and parasites	0
bacteriology—varied evidence of poor digestion	0

Two patients belonged to the cardiovascular degenerative group, one hav-

ing arterial hypertension. Three patients exhibited cardiac arrhythmia which probably had an extracardiac origin. It is possible that endogenous infections may have been responsible for both the cardiac arrhythmias and the eye attacks. There were no patients with evidences for postrheumatic or luetic cardiac crippling. We have then some reason for believing that our patients' eye lesions had no clear-cut relationship to real rheumatic fever or syphilis, if a cardiovascular examination enables one to make such a deduction.

The gastrointestinal symptoms were only elicited by direct questions and they were not uppermost in the minds of these patients. As a matter of fact, the chief complaints of this group were almost solely referable to the eyes. The gastrointestinal symptoms were mild and were consequent upon some derangement of intestinal motility and peristalsis (table 4) which seemed to be coincidental. Examination of the feces (table 4) did not seem to shed any light on the solution of these patients' chief difficulty; at least the results of the examinations, especially bacterial investigations of the feces, did not seem to allow for conclusive interpretation.

Not one of our patients had a positive blood Wassermann reaction at the time of our examination (table 5). Three of

Table 5

Lues: suspicious clinically	3
(previous positive Wassermann 1)	
current Wassermanns	0
previous positive Wassermanns	3
(2 had 1 positive)	
(1 had 2 positives)	
antiluetic treatment	6
improved on antiluetic treatment	4

them had a suspicious past history and some clinical evidence of having had the disease, but only one of these patients had had a previous positive Wassermann. Three of this group had had positive blood Wassermanns, including the latter patient. One of the positive patients had been positive on a single test and another on two occasions. Six of the group had had antiluetic treatment. There was some reported improvement in the eyes of four of these patients, only two of whom had had positive Wassermann reactions.

It is interesting to note the exhibition of antiluetic treatment in spite of a negative Wassermann reaction in these patients. Syphilis must be regarded as an almost negligible factor in the production of these patients' eye lesions. It is interesting to speculate whether or not this disease may serve to complicate ocular disease due to some other infection.

Two patients in this series were diagnosed as having pulmonary tuberculosis active (table 6). One of the

Table 6

Concerning tuberculosis and tuberculin:	
On physical examination:	
excessive apical fibrosis	6
apical râles	1
On x-ray examination (12 cases)	
normal pulmonary fields	7
apical tuberculosis	2
mediastinitis	1
increased hilum and basal fibrosis	4
Intradermal tuberculin (12 patients)	
positive patients	9
intense positives	3
(not in suspected cases)	
moderate positives	6
(includes 2 diagnosed cases)	
negative	3
These twelve cases all had other suspected foci of infection	
Successful tuberculin treatment	2
(one patient intensely, one weakly positive.)	

two had certain lung signs on physical examination and by x-ray study, while the other patient seemed to have a pulmonary lesion symptomatically and by x-ray evidence, although the physical signs seemed to be lacking. Of the twelve patients on whom an intradermal tuberculin test was tried, nine were variably positive. The strongest reactions seemed to occur in clinically unsuspected patients. It is known that three of the positive patients were treated with tuberculin, and in two of the three the eye lesions improved satisfactorily. In one of the latter patients, the intradermal tuberculin reaction was strongly positive, while the other patients' reaction was only a slowly developing mild one.

All of this group, with either diagnosed or latent tuberculosis, also had other nontuberculous infected foci in their bodies, and elimination of such other infected sites was not infrequently followed by improvement of the eye lesion. One such patient had a recurrence after five years of quiescence. Whether the intradermal tuberculin test has a worth-while place among diagnostic procedures must be answered by others in this symposium. The answer to this question must largely influence one's opinion as to whether or not this group of patients presents a significant tuberculous picture.

Routine examination of the urine (table 7) showed a faint trace of albumin in nine instances. In the urine of three patients the albumin findings amounted to more than a trace because of the presence of small amounts of pus due to a nongonorrheal prostatic infection. One of these patients (table 2) had had a urethrotomy and one reported improvement of his eye symptoms after a course of prostatic massage. The diabetic patient had a glycosuria and his hyperglycemia constituted the only positive blood chemical findings in the blood of nine patients. Eight patients presented normal blood urea, uric acid, and sugar figures. For those who may regard the presence of indican in the urine as evidence for intestinal toxemia, and believe that autointoxication is a cause for acute iritis, there will be little comfort in reading that a faint trace of indican was found in but two specimens voided by our twenty patients. Fourteen patients had normal clinical temperature readings, while three patients had temperatures above normal but never higher than one hundred degrees.

Table 7

Urine: albumin, faint traces	9
sugar	1
indican, faint trace	2
pus	3
Blood chemistry: no deviation from normal	8
glucose intolerance	1
Temperature: normal	14
between 98.6 and 100	3
not observed	3

Routine blood studies of the entire group indicate the presence of a mild anemia (table 8), while the leucocyte and the differential counts generally showed a leucopenia with an increase in the mononuclear count. It is interesting to speculate whether the anemic picture is one of cause or effect. Two of the women in our group had their first ocular inflammation immediately after miscarriage and consequent massive hemorrhage. In one of these patients it was necessary to practice radium therapy. The white cell pictures generally corresponded to the formula which Daland[12] found as evidence for the presence of focal infection, but most hematologists would probably regard such counts as indicative of a low grade chronic infection of any type.

Table 8

Blood counts:	
Women: hemoglobin over 82%	0
red blood cells over 4,000,000	2
white blood cells over 7,200 (11,000 and 8,700)	2
Men: hemoglobin over 90%	1
red blood cells over 5,000,000	1
white blood cells over 7,200 (highest 8,900)	3
Differential counts: excess of polymorphonuclears	2
excess of mononuclears (large, small, transitional)	14

A more detailed analysis of the story of infection in tonsils, teeth, nasal sinuses and prostates (tables 9 and 10) will add nothing more to this important subject. It will finally show what has already been mentioned, that seventeen of the twenty patients had one or more foci of infection in these sites at some time antedating and also following the uveal tract disease. On an average such foci were slightly over two to the patient. It will show, moreover, in accordance with common knowledge, that the eye lesions in some instances subsided after the removal of infected foci, only to recur again or perhaps to leave the patient with the scars of his inflammatory attack.

Table 9

Concerning tonsils	
Tonsil operation before eye lesion	4 patients
Tonsil operation after onset of eye lesion	7 patients
Tonsils diseased at present examination	3 patients
Diseased tonsillar remnants at this examination	5 patients
Total tonsil patients	14
Tonsil patients normal	6
Concerning teeth	
Extractions previous to eye lesion (partial)	11
Complete extractions previous to eye lesion	2
Partial extractions after onset of eye lesion	6
Teeth suspected at present examination	2

Table 10

Concerning nasal sinuses	
Sinusitis previous to eye lesion	4 patients
Sinus operations after onset of eye lesion	3 patients
Sinus lesions at this examination (same patients as above)	4 patients
Concerning the prostate	
Nonneisserian infection	3 patients
Summary	
Patients (total) with no suspected foci	3 patients
Patients with one or more suspected foci at one time or another	17 patients

At the present time the elimination of infected foci constitutes a therapeutic trial. This practice is justifiable when there is no certain means of knowing what infected foci are to blame. In a personal communication Dr. Robert A. Keilty related the experience of a patient with many recurring attacks of iritis. He had had teeth partially extracted, tonsils had been removed, he had had every possible focus cultured including the prostate and the gastrointestinal tract, and he had been vaccinated with the organisms found in the various foci. The vaccination always seemed to help an attack. After the most recent recurrence, Rosenow made a culture from the teeth of this patient, rabbits were inoculated, and the rabbits developed an iritis. Apparently much the same organisms had been previously recovered from the teeth. The patient is now receiving the new vaccines, but not enough time has elapsed to report on results.

We still have no method of really showing what suspicious foci are responsible foci unless it be the Rosenow technique, which seems to present some unusual difficulties not easily mastered. Apparently some of our surgical procedures are still incompletely adequate to cope with focal infections, as witness the unsatisfactory status of our sinus patients even after operation. Then, too, our attention may be directed to one focus and another may be overlooked.

In several instances in this group, the inflammatory process in the eye subsided after local treatment to this organ in a hospital, without the application of focal infection therapy. One patient had a first attack of acute iritis which subsided even though he refused to have infected teeth extracted. Three of our group presented no appreciable endogenous infection, and indeed there was no explanation for the ocular lesions, unless latent tuberculosis was in some way effective in two of the three.

Whether tuberculosis or syphilis may complicate or be a factor in an infection presumably focal in origin, is a point which might be discussed at great length. The influence of lues on the course of lobar pneumonia, typhoid, and lesser infections in the respiratory tract is now well known.

The anemia in these patients and the incidence of ocular infection after uterine hemorrhages suggest the possibility that such patients have their immunological reactions unfavorably influenced by anemia. Recently a young colleague practiced frequent and heavy blood donorship. Suddenly he developed his first attack of iritis. Investigation showed a slow erythropoietic response and a paranasal sinus infection. Before appropriate sinus treatment was instituted, the iritis subsided. He has had no recurrence.

Such experiences and the fact that much focal infection exists in the absence of ocular lesions suggest that the

existence of an infected focus is not the sole link that leads up to secondary or metastatic lesions.

Nothing in this analysis suggests whether the secondary lesion is due to the transference of organisms from the initial lesion, whether the secondary lesion is due to a toxemia, or whether the eye lesion is an allergic phenomenon. There is much animal experimentation that seems to argue for an organismal metastasis. The possibilities of the intact gastrointestinal tract as an endogenous focus are not suggested in this series. Admittedly it may function as such, at times, if the tract is inflamed, or if there exists gallbladder or appendiceal inflammation. Under any circumstances, the infection must be most unusual if it can pass uninfluenced through the defensive mechanism of the liver.

In our series of cases, one patient had frequent colonic irrigations for a year or more and took vaccines made from the intestinal flora. Two others had recourse to irrigations for a short period of time. One patient thought her eyes had improved during the irrigation period. Whether one can regard such an experience as constituting a positive therapeutic test seems questionable. No parasites or ova were found in examining the feces of eight patients. It has been suggested that nondysenteric amebiasis may account for an iritis when no endogenous foci are found.[18]

Four women reported menstrual irregularities of mild degree, but no complaints suggesting pelvic inflammation were elicited. Pelvic examination of six women including the above mentioned four was negative. Whether the pelvis can be an endogenous infective site seems uncertain from the literature but this question does not seem of importance for our series.

Summary and conclusions

It is appreciated that this group of patients is small in number and includes those with eye lesions of other portions of the uveal tract than the iris, and that the cases put down as iritis may not represent the acute variety designated for consideration in this symposium. Nevertheless, certain facts must be evident from this analysis and from the experience of others as set forth in the literature, and they are as follows:

(1) Many inflammatory attacks in the uveal tract subside promptly after elimination of endogenous infections by appropriate measures.

(2) Patients with inflammatory lesions of the uvea or of a portion of this tract have generally but not invariably one focally infected site and more frequently two or more such foci. The incidence of focal infection in nonocular cases may be as great and greater, as is shown in the control group cited.

(3) The most frequent foci in our group and in other groups similarly studied are to be found in tonsils, teeth, accessory sinuses, prostates and the respiratory tract. The gastrointestinal tract and the female pelvis must very rarely be the seat of a primary infection leading to a secondary eye lesion.

(4) Some patients with ocular inflammation seem to have no possibilities for endogenous infection.

(5) Some iritic attacks subside without focal infection therapy.

(6) Some patients have recurrent attacks. These may be due to overlooked foci, inadequate therapy, or the development of new foci.

(7) Acute and chronic iritis and iridocyclitis have been produced experimentally by a technique or techniques which seem to show with reasonable certainty that focal infection is an etiological possibility for inflammation of the iris.

(8) Other conditions may be necessary to make a focus of infection serve for ocular metastasis. Such conditions may be an anemia, tuberculosis, syphilis, diabetes, lack of local tissue immunity, or some electivity on the part of the invading organisms. Poor local drainage in the infected focus may change it to one acting as a portal of entry.

(9) In our series tuberculosis may have been an etiological factor of greater importance than would appear on first inspection, if the intracutaneous tuberculin reaction is a reliable test.

(10) Many causes at one time assigned as responsible for iritis do not appear in this group.

(11) It appears that the cause of acute inflammation of the uveal tract, including iritis, is not always easily discovered. In all probability a variable number of conditions and circumstances must coexist to make for such eye lesions. Such variables apply to both the host and the invading microorganisms. At the present time it seems that endogenous infections play a large part in the production of acute iritis and that their elimination is a therapeutic desideratum.

Note: For the opportunity of studying this group of patients the author is deeply grateful to Dr. George E. de Schweinitz, Dr. William Campbell Posey, and Dr. B. Frank Baer. In discussing the relationship of endogenous infections and acute iridocyclitis, Dr. Baer called our attention to the decreasing morbidity rate for this eye lesion in hospital and private practice. This, it was suggested, might be the result of the increasing amount of attention which has been and is being directed toward elimination of focal infection. Some support for the principle of focal infection in relationship to diseases of the eye may come from future statistics showing a decreasing incidence of inflammation of the uveal tract and increasing prophylaxis against focal infection.

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Discussion: CHAIRMAN ZENTMAYER: Questions pertinent to Dr. Schnabel's contribution to the symposium are now in order.

DR. VERHOEFF: I should like to ask the essayist, if he went out on to the street and at random took twenty patients about the same ages as these patients and made the same examinations on them, how many he would expect to find did not show some evidence of focal infection.

DR. SCHNABEL: Probably the incidence of focal infection in the population generally would be about as frequent as that to be found in this group. This is an argument always presented by those who are not in accord with the focal infection idea. In the Philadelphia Hospital we have in many beds very badly focally infected patients who never have acute iritis or arthritis.

CHAIRMAN ZENTMAYER: Are there any other questions?

DR. GREENWOOD: I have this question from the floor: Explain the relation between paroxysmal tachycardias and acute iritis.

DR. SCHNABEL: I do not know that there is a necessary relationship between them. I know it is rather hazardous to say that paroxysmal tachycardia can occur without a cardiac lesion, but I am quite sure that occasionally we have seen patients with cardiac arrhythmias (and included in them is paroxysmal tachycardia) who have been relieved by the elimination of a focus of infection.

I reasoned by analogy when I put down paroxysmal tachycardias in these patients. It doesn't mean necessarily that any relationship exists between these eye lesions and those disturbances of cardiac rhythm, except that the same cause (if we acknowledge focal infection as a cause) might be operative for both conditions.

EVALUATION OF ETIOLOGIC FACTORS IN ACUTE IRITIS

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The author evaluates the following factors in acute iritis as of importance in the order indicated: (1) focal infections, (2) syphilis, (3) the undetermined causes, (4) probably tuberculosis, (5) the infectious diseases and the exanthemata, (6) skin affections. Read before the Association for Research in Ophthalmology, June 24, 1930.

I have had a few difficult tasks assigned to me but none so difficult as the one I am now supposed to undertake.

For a proper evaluation of the etiologic factors of iritis it would be necessary for the same corps of competent physicians to make complete and identical examinations on a large group of patients of different races and varying ages, and occupying various social stations in life. No such statistics exist. If they did, we should still be confronted by our ignorance concerning many medical questions requisite for a satisfactory completion of our task.

Ophthalmic literature abounds with references to uveal disease, but, unfortunately for the purposes now under discussion, great reliance cannot be placed upon much of it. What is needed is a cold analysis of the results of examinations made under such conditions as above mentioned, and this is difficult to achieve. Unfortunately, for certain purposes, medicine is not free from its vogues and fads, nor from those who quickly place immature and uncertain data before us bearing on every new problem presented; the competitive author also contributes his share; and last but not least we have those contributions where the most carefully studied and the most convincing thing in the literary product is the title.

When we approach the medical aspect we are immediately confronted by the old controversy as to whether toxins, as well as the bacteria which generate them, are capable of causing the disease. I believe it is generally conceded that during the past ten years or more there has been an increasing tendency to regard the bacteria and not the toxins as responsible; still, if our present knowledge is correct, toxins are capable of producing pathologic conditions elsewhere in the body. But Axenfeld and others are quite correct in stating that this need not necessarily render them deleterious to ocular structures. The supposed selective tissue affinity of certain bacteria, based upon the most painstaking animal experimentation, while freely accepted by some, is not viewed with favor by all bacteriologists. If such tissue affinity exists as to the bacteria, have their toxins a similar affinity for the same tissues?

We all know how frequently in the study of a uveal case either we fail to find any plausible factor that we can honestly accept as a cause, or we find several present. In the first instance we openly confess our helplessness and ignorance, and in the second we are confronted by the impossible task of positively determining which is the provoking lesion. I am convinced that repeated examinations would lessen the number of cases falling in the first group. To illustrate, I might mention a negative nose and throat examination, made by a skilled observer, which was followed within five days by a diagnosis by the same observer of a deep, small tonsillar pocket, evacuation of which was followed by prompt subsidence of the ocular symptoms.

In the presence of a focal infection, are we justified in positively asserting that it was the underlying cause, if the patient improves after its removal? I admit that such a sequence is strongly suggestive, but do we not see frequently recurrence after recurrence, in spite of eradication of inflammatory foci at first assumed to be the probable etiologic factors? I realize that in such cases there is a possibility that the region of secondary involvement, namely

the eye, may harbor a persistent low-grade inflammation that persists for weeks without external manifestations, only to be fanned into activity by some minor insult that the organ would normally disregard.

Another factor that vitiates accuracy in questions of this character is the coexistence of some constitutional or metabolic disease in conjunction with focal infections. In diabetes, with the individual more vulnerable to septic processes, is an iritis to be attributed to the diabetes or to an associated focus of infection? The observer, impressed with the importance of metabolic disturbances, would probably record it as due to diabetes, while the focal infection enthusiast would stress the associated condition.

Some or possibly all of these detracting comments that I have made may be regarded as academic hair-splitting, but there is no stage in the study of a medical condition where hair-splitting is more justifiable than in the etiology of the condition.

Unfortunately, we are deprived of most of the advantages that the autopsy room provides for the study of disease in most other organs, although such observations would be of great service in the subsequent histologic and pathologic study of the eye. In the light of these facts (or shall I say statements?) the layman afflicted with uveal disease might regard his condition with justifiable apprehension, but fortunately for him our academic ideas and theories are not relied upon. We become practical physicians with common sense, and after a complete medical survey we eradicate or treat as best we can all pathologic conditions uncovered, whether these be constitutional or focal. Our deductions as to the etiologic factors are then made and, as I have above inferred, these are not always free from bias and from the dominance of any pet theories we may have.

The subsequent remarks will pertain to endogenous iritis and, unless by incidental remarks, traumatic cases, purulent metastatic processes, and sympathetic disease will be excluded. While all cases of iritis may be properly classed as uveitis, certainly not all cases of uveitis are cases of iritis, therefore uveitis as most of us understand it will be excluded unless so specified. Needless to say the lack of sharp differentiation between the iris and ciliary body in this pathologic process is recognized.

Twenty years ago four etiologic factors were outstanding in cases of iritis, namely syphilis, tuberculosis, rheumatism, and so-called idiopathy. Since then an increasing importance has been associated with various types of focal infection, with the result that in this country most cases that in the past would have been regarded as rheumatic and idiopathic are now classified under the focal infection group.

In the earlier observations Veit found 1,495 iris involvements among his 33,830 eye cases. Out of these, 118 cases of acute, 419 of chronic and 134 of serous iritis, a total of 671, were assigned to the idiopathic group, an incidence of 44.8 percent. In 1902, Baum cited an incidence of 26 percent for existing or suspected lues, 15 percent for existing or suspected tuberculosis, and approximately 10 percent for rheumatism. While we have assigned most of our rheumatic and idiopathic cases to the focal infection group, physicians on the Continent, particularly in Germany, have apparently shifted them to the tuberculosis group. As a result of these changes we now have three prominent groups, the syphilitic, the tuberculous, and the widespread group of affections comprised in the focal-infection group.

Syphilis has generally been regarded as the most conspicuous factor, but when we come to look over the literature we find the greatest variation in statistics submitted by different authors and from different clinics. Five years ago, before the Academy meeting in Philadelphia, I discussed in detail the etiology of uveitis and cited statistics in which the incidence for syphilis varied from the low figures of Lang (six percent) and Goulden (nine percent) to the high figures of Clapp (eighty percent) and Campbell (seventy percent). At the time when Camp-

bell wrote he incidentally remarked: "the rheumatic iritis of the textbooks I do not know the meaning of."

During the past five years various reports have been made by different authors, in this country notably by Bulson on iritis and by Newton on uveitis. The former found an incidence of approximately thirty-three percent. As far as my knowledge goes, the most reliable studies of this character that have been made in this country, or for that matter in any other country, are those of Brown and Irons. It will be recalled that in their series of two hundred cases syphilis was found as a solitary factor in but six percent, and in combination with other causes in thirteen percent, giving a total of nineteen percent in which syphilis was present.

My own experience corresponds in a certain sense with that of Brown and Irons, in that I have found in the majority of cases that in the syphilitic more than one possible source of infection is apt to exist. While I have not carefully reviewed all of my cases, I believe the incidence for associated syphilis would be somewhat higher than was found in their series. Allowing a wide range, I should think the incidence for the disease as encountered in the average mixed clinic would be from twenty to thirty-five percent. How frequently the eye disturbance is actually dependent upon syphilis or is possibly due to a bacterial invasion from an associated condition, resistance having been reduced as the result of the constitutional disease, it is difficult to say. On the other hand, it must not be overlooked that we have reached a period when the influence of our many well conducted syphilitic clinics should have some bearing on the question of incidence, so far as this factor is concerned.

Syphilis has never been more thoroughly and more persistently treated than at the present time, so that it is quite conceivable that in some of our recurrent cases the first attack was syphilitic, since under successful treatment most evidences of the disease, including a positive Wassermann test, may be absent. In one of the subsequent attacks another associated condition might well be held responsible. However, most patients sooner or later tend to be honest as far as their histories are concerned.

When we come to consider tuberculosis we are confronted by a wide variation if we contrast most German statistics with our own. Gilbert's figures of a tuberculous incidence of forty-five percent in iridocyclitis are quite consistent with those of Hessberg and Löwenstein, who cited a tuberculous incidence of fifty percent for uveal tract involvement. Brown and Irons' statistics gave a tuberculous incidence of four percent, and tuberculosis as an associated condition in an additional twelve percent, and I question whether the figures would be found to be much higher in the statistics of other American clinics. I am fairly well convinced that few clinics in this country would probably exceed twenty-five percent of tuberculosis for the whole uveal tract. Wilmer's forty percent would probably be the highest.

As I have said elsewhere on several occasions, it is probable that we are stressing focal infections too much, as we have been reminded by our German colleagues, but as yet I have failed to see them acknowledge what most of us believe, that they are probably overstressing tuberculosis to an equal extent. It is possible that in another ten years the contrast in these figures will not be so striking.

There is no trouble with the diagnosis of certain types of tuberculous iritis, but in others where there is an absence of nodules, or where these may be tiny and of short duration, the clinical signs are not so convincing and such a case is inevitably more or less baffling. It is in these cases the slit-lamp may be of service. In their paper for this year's Section on Ophthalmology of the American Medical Association, Goldenberg and Fabricant report evidences of three cases of primary iritis among 1073 cases of proved tuberculosis, and they regard one of these as having depended upon syphilis. These

figures, of course, are quite low, and they are probably comparable to the low incidence for iritis encountered by the syphilographer. These authors state that in the many forms of iritis or iridocyclitis that present themselves, in which the etiology cannot be ascertained by any of the methods at our disposal, a diagnosis of tuberculosis based on the reaction (I presume skin reaction is meant) resulting from the use of tuberculin is not in their opinion justified. With this statement I am in hearty accord. (As a matter of fact, irrespective of statistics here or abroad, it is only the exceptional case of iritis that has convinced me of its tuberculous character.)

While there is probably no country in which the citizens have cleaner and better kept mouths than in America, still we find an abundance of dental and tonsillar affections. England also finds her share, but most portions of Germany seem to be more fortunate. Elschnig in 1925, in his series of cases of iridocyclitis, found an incidence of twenty-five percent for tuberculosis. Of twenty-nine of Elschnig's cases studied by Back for oral sepsis, two were negative, in twelve it existed alone, and in fifteen cases it was associated with other findings; in four with a positive tuberculin reaction, in six with indican, and in five with indican and a positive tuberculin test. Thus it is evident that in some quarters the conclusion is more a matter of interpretation than of actual findings. We all realize the importance of thorough medical examination and x-ray of the chest. Heine states that the exclusion of tuberculosis is risky, since the majority of individuals react to from five to ten milligrams of old tuberculin; but that absence of definite family history and clinical findings together with a negative tuberculin reaction would positively exclude it. It would be interesting to know just how many apparently healthy individuals with absence of definite family history and with negative clinical as well as ocular findings would react to from five to ten milligrams of old tuberculin.

In diabetes, gout, and rheumatism, we are dealing with three conditions around which there has been much controversy, and some observers have excluded altogether the two affections last named.

Concerning diabetes the reported incidence, while variable, has been consistently low. Galezowski found five, Lang 2.5, and Kako 1.07 percent. Gilbert lists it with furunculosis and credits them jointly with 0.8 percent. Brown and Irons do not give diabetes a special heading, and Goulden did not find a case among his shorter series. The statements of Foster Moore and of Garrod are interesting, the former having seen but one case of primary iritis in diabetes where no other cause was discovered; while the latter believed that some of the ocular lesions attributed to diabetes by Leber might be classed as examples of the special susceptibility of diabetic patients to septic infections.

As to gout, so far as my knowledge is concerned, its stated relationship to iritis has remained unchanged during the past ten to fifteen years. There are those who, like Ormond, have stated that they do not know what gout is and cannot make out that anybody has a clear idea on the subject. If it was a bacterial condition then Ormond believed it might be a possible cause of iritis. I agree with de Schweinitz that, in view of what develops in other structures as the result of faulty nitrogenous metabolism, there is no reason why the iris may not be involved, but I have never seen a case of iritis that I could confidently assign to this condition. Lang conceded 3.5 percent (private patients) while Gilbert cited an incidence of one percent.

As is well known, certain observers have practically eliminated rheumatism from the etiology of iritis. Personally I can say that I have never seen an iritis associated with acute rheumatic fever. But when others definitely state that they have seen such cases I believe their statements should be given some consideration. Pockley, writing in 1920, said he had personally seen two such cases and knew of others in persons

with authentic histories. His own opinion was that rheumatic iritis might be of the nature of a myositis or fibrositis of the muscular and connective tissue of the iris, caused by a chill, exposure, slight trauma, or errors of diet with imperfect metabolism of proteins in a rheumatic subject, just as myositis, fibrositis, or arthritis may be so caused elsewhere.

We are all familiar with the isolation of the so-called micrococcus rheumaticus of Payne and Poynton. But in 1927 this whole subject took on renewed interest when J. C. Small, working in the laboratories of the Philadelphia General Hospital, isolated from the blood, and later invariably from the throats, of patients suffering from rheumatic fever a streptococcus of the nonhemolytic type, which he designated the streptococcus cardioarthritidis. This is no place to dwell upon his findings or on those of other observers who have isolated the same or a similar streptococcus, and those of you who are interested may readily refer to his several contributions on rheumatic fever since his original publication. He has emphasized the fact that "rheumatic fever should not be considered as an acute arthritis, as a disease of the heart, nor yet as a disease of any particular system or group of organs, but as a general disease producing characteristic pathologic lesions of widespread distribution". He has referred also to the increasing tendency to regard it as a bacterial allergic manifestation. He has had opportunities to study a large group of these cases at the Philadelphia General Hospital.*

In regard to chronic arthritis, including the rheumatoid type, I am sure we have all seen instances of associated iritis and uveitis, and in my experience often progressively bad ones. Small states that while there is a relationship to rheumatic fever it is not well understood. In a recent publication he also considers this type as an allergic disease, the hypersensitive state of the patient being due to an allergen contained in streptococci without regard to the particular type.

Focal infections as a group contribute the highest percentages in our American literature. Oral sepsis and the disturbances of the pharyngeal ring constitute the highest group. Brown and Irons conceded forty percent to teeth and tonsils, excluding their involvement as associated conditions, while Bulson credited them with sixty-four percent. When we come to the nose and accessory sinuses, to the genitourinary tract and the gastrointestinal tract, which might include the gallbladder, there is a sharp falling off.

While the teeth and tonsils have maintained their dominance in this group as a whole, the importance of the accessory sinuses has gradually decreased to what I believe is about a fair estimate of their contributing tendency. I recall quite vividly one contribution of about twenty years ago, in which a series of cases attributed to this cause was recorded from the practice of one man, in which as I recall it none of the cases was thoroughly studied from an etiologic standpoint, which was indeed an "accessory" contribution, except to the problem of the etiology of uveal inflammations.

The genitourinary tract deserves a proper amount of consideration. It is not my present function to trace the history of the gonococcus in its relation to disease of the uveal tract, but it is fitting to refer to the greater importance that was attached to this organism some twenty years ago, and which was one of the factors that broke down the high incidence attributed to rheumatism. Its causal relationship has varied as much in statement as has that of syphilis and tuberculosis. During the past twenty-five years one can find statistics varying from 0.33 to 43 percent, probably the greatest number being between three and twelve percent.

Having always a wholesome respect for the abilities of this organism, but being not entirely reconciled to its alleged powers of endurance, despite re-

* In a later conversation with the writer Dr. Small stated that he had seen iritis in several such cases, but that in all of these the manifestations were mild.

ports that extolled its longevity and belittled the "weakness of the flesh", some eight years ago I spoke to the late Dr. B. A. Thomas concerning this question. He advised me he had never seen the gonococcus persist (demonstrably) longer than three years. His views concerning it are adequately expressed in a contribution by Zentmayer in 1926.

It is now pretty generally accepted that most of the prostatic cases show a mixed infection. Concerning this I was amazed to find, in going over some of my iritis cases, that among seventeen unselected male patients there was a prostatic involvement in eight, or 47 percent, but in no single instance was it a solitary finding, being most frequently associated with tooth or tonsillar infection. I realize this is a high incidence, but it is offered as a definite finding and the examinations were made by men of excellent experience. It is questionable whether so high an incidence would have pertained in a much larger group.

I have seen on a number of occasions, as probably has been the case with many others, that in a case of iritis there was a prompt lighting up of the symptoms within twenty-four hours after massage of the prostate. If this occurred on one or more occasions should we be justified in positively assuming that the prostatic condition was the etiologic factor responsible for the iritis? If the prostatic condition were a solitary finding, I believe we could with propriety regard it as strongly suggestive; if, on the other hand, it were an associated condition, then to my mind much of the support for such a contention would fail. In the presence of an acute inflammatory attack of almost any origin, might not the abrupt release into the blood stream of a quantity of bacteria or even of their toxins be sufficient to accentuate temporarily an inflammation once developed? On several occasions I have seen this accentuation of the process persist but a couple of days.

In the light of our present knowledge the genitourinary tract is of greater importance in the male sex, but uterine disease, menstrual disturbances, and leucorrhea have all been recorded as contributing to uveal disease in the female. It must not be overlooked that detection of the gonococcus in the female is a much more difficult problem than in the male.

As to the gastrointestinal tract, all of us realize the possibilities of this large chemical distributing plant, but it must not be forgotten that many of these chemical agents arise through the activity of bacteria. Enteritis, colitis, appendicitis, and cholecystitis have occasionally been recorded as possibilities, but, so far as intoxications are concerned, I personally do not know of any positive findings that have given us a better understanding of these conditions or of their definite causal relationship to uveal disease than existed at the time of de Schweinitz' admirable contribution to the subject of uveitis in 1913.

The infectious diseases, the exanthemata, and certain vaccine therapy such as typhoid inoculations, as recorded by Calhoun, contribute a small percentage. Certain skin affections, such as furuncles, eczema, dermatitis exfoliata, as recorded by Gifford, and Schönlein-Henoch's purpura discussed by Benedict in the Section on Ophthalmology of the American Medical Association, also contribute to uveal disease, but rarely so. Here might be noted the iritis occurring in herpes zoster. Among nineteen cases, Rollet has referred to ten with secondary iritis and nine with primary.

Usually the ocular manifestations present in uveoparotid fever appear as a uveitis. As to etiology we are still in the dark so far as positive statements are concerned; for our present purpose this condition remains unassigned.

I believe you will all be generous enough to agree with me that to attempt anything more than a gross classification of the frequency of the various etiologic factors from the facts at our disposal would be futile. I should place the factors I have referred to in the following order: (1) Focal infec-

tions, with predominance of oral sepsis and the disorders of the pharyngeal ring; the genitourinary tract ranking next in importance; and, while there may be justifiable objections, also including gonorrhea in this group. (2) Syphilis. (3) The undetermined group. (4) Probably tuberculosis. If we were including the whole uveal tract I should rank tuberculosis third. (5) The infectious diseases and the exanthemata. (6) Skin affections.

1819 Chestnut street.

Discussion: Dr. Verhoeff: I should like to ask Dr. Holloway if the summary that he gave at the end of his paper applied only to acute iritis.

Dr. Holloway: The summary that I gave at the end, Dr. Verhoeff, did apply only to iritis and not to disease of the uveal tract. Furthermore, it was a summary based not only on my personal experience but what I judge would be the situation in the various clinics of this country.

Dr. Greenwood: I have a question from the floor: What is the importance of an infected corneal erosion as a cause of acute iritis in the presence of such other foci as diseased teeth and tonsils.

Dr. Holloway: I don't know whether the question as given by the Commissioner is particularly pertinent or not. I don't know but what it confuses a primary with a secondary iritis. I think this would be extremely difficult to answer. Much would depend on the character of the erosion. If it were simply an erosion or abrasion I should think it could be eliminated. If it were an abrasion that went on to definite corneal infection I think it would be impossible to tell.

This brings up a very interesting point that sounds somewhat contradictory yet bears not only on this question to a certain extent but on the question of trauma in these cases. I refer to the statement of Lionel Smith in England, who in 1916 stated that he believed bacteria or their toxins prepared the way but it was some trauma that precipitated the attack, irrespective of whether the part involved was a joint, a nerve, a muscle, or the eye. In contradistinction with that, Flexner shortly afterward stated that he believed it was trauma that prepared the ground and that subsequently it was the bacterial or toxin invasion that precipitated the attack.

Dr. Wilmer: Do I understand Dr. Holloway would put syphilis third in order of frequency of the etiologic factors?

Dr. Holloway: Second. I have taken the distinction away from syphilis. It has always been recorded as running from forty to fifty percent until our recent statistics. I would place it second to focal infection.

HYPOTHESIS REGARDING SO-CALLED AMBLYOPIA EX ANOPSIA

HOWARD MCI. MORTON, M.D., F.A.C.S.
MINNEAPOLIS

The author takes the view that the term "amblyopia ex anopsia" is a misnomer; that the eyes to which it is applied are congenitally amblyopic through defects related to structural and functional neurology, with imperfect macular or sometimes paramacular vision; so that the amblyopia is really the cause of disuse and not its consequence. Read before the Thirteenth International Congress of Ophthalmology at Amsterdam, September, 1929.

Although the view here presented is designated a hypothesis, it has supporting clinical evidence. Since this evidence is not yet sufficient to more than indicate the tenability of the hypothesis, the subject is presented mainly to provoke interest in the study of relationships of "dark adaptation" to certain clinical types of amblyopia, rather than to arouse controversy.

The hypothesis may be stated thus: Amblyopia arising from disuse (so-called amblyopia ex anopsia) is a misnomer and rarely if ever exists. These eyes are congenitally amblyopic through defects related to structural and functional neurology. There exists an inadequate supply or a defective function of the cone elements of the retinal epithelium, with normal number or relative increase of rod elements. These are "scotopic" (or "dark adapted") eyes; their visual characteristics are a permanently defective macular or paramacular (qualitative) vision and often a fully extended peripheral function exhibited in a full, quantitative peripheral field. This hypothesis assumes that the disuse is an inevitable sequence of these congenital defects, and is or is not associated with evident deviation of the eye from the normal line of regard. The qualifying word "evident" is used with intent. It is improbable, in the presence of an amblyopic eye, that the relationship of the lines of regard of the affected and the unaffected eye is such as to permit corresponding retinal identity. Although deviation may not be apparent, testing will usually reveal its presence. Conversely, the inference is that the amblyopia is the cause of the disuse, not disuse the cause of amblyopia.

Existing confusion arising from terminology: Amblyopia, properly defined, is diminished visual function without evident cause. The term has been incorrectly applied to lowered visual acuity arising from evident conditions or their sequelæ. An ametropic eye with poor vision in which correction establishes approximately normal vision is not to be designated amblyopic.

Exclusion and amblyopia are not synonymous terms, neither are they interchangeable. Exclusion may exist without amblyopia, presenting an absence of binocular single vision with retention of a potentially normal, but suppressed, visual acuity. A striking characteristic of true amblyopia is found in the fixed degree of diminished function of the macular, or strictly visual, regions of the retina. The vision is not often improved materially through the interposition of glasses. Whatever improvement may occur is related more to the outer regions of the retina, and thus is more quantitative than qualitative in character. While there may be general visual improvement the vision is not of that definitely clear character representative of macular function.

Even in the excluding eye there may be varying degrees of diminished function, or there may be completely normal, but suppressed, monocular visual acuity. Some of the elements of exclusion may be present in the amblyopic eye. It is not in these eyes (with amblyopia ex anopsia) that we are to look too optimistically for improvement through orthoptic training, for the reason that their central or macular limits of visual improvement are definitely defined by their congenital char-

acter. Cases responding to treatment are usually those in which the excluding eye possesses good, but suppressed, central vision. Here, the problem is the changing of the disassociated binocular character of vision into binocular single vision. The assumption that this may occur in true amblyopia is not justified after the recognition of its character. The two problems are different and this should be understood. In the first problem the end sought is restoration of proper function through the eyes working together for normal binocular single vision. The second problem would relate to an actual development of vision where previously good vision had not existed. In the former, cerebral fusion is the main factor in converting the disassociated binocular character of vision into normal binocular single vision, muscle imbalance also playing its part. The amblyopic eye is not responsive in the attempt to restore parallelism through reestablishment of binocular single vision.

In the excluding eye, correspondent retinal identity (for visual clarity) is the impelling factor that calls forth the power of the fusion faculty. These two—retinal identity and fusion—are the principles concerned in restablishment of binocular single vision. Certain satisfactory cases exist where deviation and exclusion are associated and where development of the fusion faculty brings about normal relationship of the lines of regard. An eye may exist for a lifetime as an excluding eye and yet retain suppressed monocular vision equal to, or even surpassing, the vision of the functioning or fixing eye. These cases are not common, but they do occur. In amblyopia lowering of macular function offers little incentive to fusion effort, since correspondence in retinal identity, even if occurring, would, on account of the poor image in the defective eye, render the initial task of fusion almost inoperable and difficult in continuance.

In the new-born, before fixation has been established, one may observe incoordination in the associated directional excursions of the two eyes. The eyes are seeking retinal correspondence, finally bringing this about through the experience that clear vision is obtained only at each macular region and through the proper functional association of these regions. The fusion faculty is the direct and controlling force that responds to this call for avoidance of visual confusion, and through this response binocular single vision becomes established. When dealing with an amblyopic eye in the new-born these clinical phenomena are not so definitely observed. The annoyance of visual confusion arising from nonretinal identity is not present, or if present is lowered in degree.

Out of confusion in terminology has arisen apparent difference of opinion. In answer to the contention that parallelism is not obtained through nonoperative treatment, one may be confronted with denial, when in fact the same concept is not present in the mind of each person. Where parallelism of the lines of regard is occasionally brought about it is in only one of two distinct types—i.e., the type where binocular (not single) vision alone is present. Such favorable results may occur in excluding eyes with deviation; they do not occur in truly amblyopic eyes associated with deviation (amblyopia ex anopsia).

Thus, the problem of establishment of binocular single vision, in an excluding eye with normal monocular vision, by orthoptic training is not one to be confused with the development of vision in an eye that is congenitally subnormal in acuity. In neither case is it probable that change occurs in the actual monocular visual value of the deviating eye, neither in the amblyopic nor in the excluding types. In the amblyopic organ, vision remains within the fixed limits of its function; in the excluding eye, its normal but suppressed acuity has made possible the bringing of its line of regard into proper accord with its normal fellow and with establishment of binocular single vision. In amblyopia the immediate problem is development of visual function of a

macular character; after this, the problems of retinal identity and fusion. In amblyopia, the form sense is often wide in expression, while the central field indicates a loss in functional acuity. (See author's monograph on perimetry, v. 12, American Encyclopedia of Ophthalmology.) This central (macular) field is the area of expression of the higher functions of vision, indicated in higher visual acuity and in finer perception of color values. This region is the area of cone activity, which greatly diminishes toward the periphery, where a proportionate increase in rod supply over cone supply exists.

Concepts regarding relationships of amblyopia and deviation: Tendencies in ophthalmological teaching and prevailing opinions have been to regard strabismus as arising from an abnormal relationship between accommodation and convergence, and to assign to this disturbed relationship a dominant and important rôle in the origin of so-called amblyopia ex anopsia. It is the writer's belief that this relationship, fundamentally speaking, occupies a secondary place in the etiology of this clinical class. In the drama of axial deviation these disturbed relationships may appear as determining factors in the presence of conditions that are more fundamental. The concepts referred to, representing views held, embody the idea of ametropia of such character and degree that, when adjustment of accommodation with convergence is attempted, the catastrophe of deviation occurs.

It has been the conviction of the writer that the relationship between cause and effect has been reversed, and that deviation and disuse arise from amblyopia, not amblyopia and its resulting deviation from disuse. The question of interest and importance is: What constitute the fundamental conditions concerned with the cause of the amblyopia?

Parinaud, Priestley Smith, Berry, Maddox, Worth, and Römer questioned the importance of the causal relationship between hyperopia and deviation, and ascribed inherent diminution of fusion power as the precedent condition. The writer is in accord with these views but believes (1) that there exist more basic conditions making the exercise of the fusion faculty more difficult and in some cases impossible, and (2) that these conditions are related to the structural and functional neurology of the macular and paramacular region.

Are present concepts regarding amblyopia and deviation correct? Donders, long since, ascribed strabismus to malrelationship between accommodation and convergence. While this has importance it is not the fundamental cause of deviation of the visual axes from that normal parallelism essential to binocular single vision. This becomes evident as we analyze the phenomena of deviation in its relationship to ametropia. While it is true that convergent strabismus occurs in some hyperopes, yet comparatively few have convergent axes; this is a significant observation. Deviation is sometimes present in emmetropia and myopia. In young children, correction of hyperopia does not always result in parallelism of the lines of regard. Another small class are slightly improved, leaving a not large group to represent the satisfactory results in which correction of hyeropia is attended with a restoration of parallelism.

In this favorable group of cases, fusion does play a part in the clinical drama. There is one explanation to be found, i.e., a lesser strain on the fusion sense, through the establishment of a more nearly normal physiological relationship between accommodation and convergence. However, there exists the much larger clinical group of high hyperopes, who retain parallelism with binocular single vision. In these we must depart from the mathematical conception that each meter angle of convergence must have a corresponding diopter of accommodation; for a hyperope of four diopters, in overcoming his error of refraction, would, on the basis of a mathematical theory, converge four meter angles. We know accommodation for this four diopters may be accomplished and yet retain parallelism,

binocular single vision and correspondent retinal identity. Theoretically, such a case should present converging lines of four meter angles and loss of binocular single vision.

The tendency has been to refer the explanation of this riddle to the mysterious function we call fusion. What are we to understand by fusion? We cannot think of it as a motivating force generated in the visual cortex and carried to the eyes, in the same sense that we should conceive of a motor nerve impulse. In the case of fusion, there is something still above our conception of an underlying motivating current. Matters here concerned are to be expressed in higher realms, those of the purely visual and purely psychic. Here matters of visual memory and visual judgment are to be considered before we reach the lower levels of response carried to the two eyes. How can we be assured that there is any difference in the degree of power of the fusion sense of different individuals except as we find its final expression in binocular single vision, or in its absence?

Thus we are confronted with a suspicion that not only must the faculty of fusion be considered, but the transmission of this demand for fusion must not be interrupted or interfered with in the clarity and force of its expression. It is conceivable that interference might occur; it is more than likely that some obstruction found within the eyes themselves inhibits this clarity and force. According to the degree of defect within the eyes we should observe varying degrees of expressed fusion power, thus finding in the one case a force able to overcome eye malrelationship between accommodation and convergence, and in another case such diminished expression of this force as to be impotent, even in the presence of normal relationships between accommodation and convergence. An explanation of these intricate problems may be found in a more fundamental background than is supplied by fusion. Possibly the solution of the problem may be found in the observable fact that the deviation is occurring in a dark adapted, or scotopic, eye and that this tendency arises from impaired macular vision, not necessarily from pathology, but from faults of structural or functional neurology.

It is proper to consider at this point the significance of the two elements of the visual epithelium. There is reason to believe the rod elements the more primitive structures of the two. The vision of the primitive creature was largely of a phototropic or photostatic nature. The strictly visual character of vision was not present and was developed later through evolution of cone function. The primitive eye met the demands for form and motion perceptions which we recognize as the principal expression of the peripheral, or rod, field.

We must digress to consider the significance of dark adaptation and the fundamental basis upon which this phenomenon stands. Our visual perceptions are the elaborated and interpreted results of the correlated functions of the higher and lower centers of the visual cortex, after these areas have been the receptors of impulses. Light perception has been considered heretofore as the most primitive of the several visual perceptions, but we must now note, following more recent investigation, that the perception of motion is perhaps the most basic and primary.

That degree of illumination where the light stimulus is first perceived we speak of as the threshold. The threshold is, therefore, the least distinguishable light in the darkest possible field. In our studies of light and dark adaptation we find two manifestations of clinical interest; the one we designate light minimum, the other light difference. The former is a phenomenon observed when light intensity is gradually reduced and is a point at which this reduction reaches the degree at which light sensations are no longer perceived. The light difference is the smallest observable variation in the degree of intensity of two lights. The light minimum more directly concerns us, since this phenomenon is more related to the rod structure of the retina.

The retina undergoes a series of catabolic and anabolic changes according as it is actively subjected to exposure of light or passively inactive in darkness. Upon entering a dark room our vision is imperfect, but it rapidly improves. In this case, the degree of surrounding darkness has not changed—the eye has become "dark-adapted." To become fully dark-adapted, the eye must be in darkness for a long period (about an hour). The fovea is essentially the retinal area for bright vision; the processes related to dark adaptation are largely—not exclusively—allocated to the extramacular regions.

The experiments of Hecht and others indicate that the range of adaptation in the retinal periphery is more rapid than at the fovea. The knowledge we possess today points with considerable certainty to the tenability of the conclusion that the basis of dark adaptation is a protolysis resulting in the formation of two products of decomposition. The concentration of these products at any moment determines the sensitivity of the sensory mechanism, in that the protolytic forces that affect vision are directly proportional to the concentration of protolytic products already present.

A consideration of these subjects of light and dark adaptation has very naturally brought about what has been designated "the duplicity theory". By this theory we understand that visual perception, when associated with low illumination intensities in the dark-adapted eye, is carried out by means of rod elements of the epithelium and designated "scotopic" vision; when the visual perception is associated with higher illumination intensities in the light adapted eye it is a function of the cone elements and is designated "photopic" vision.

Analysis of the progress of dark adaptation has shown that it corresponds in time value to the course of a so-called "bimolecular reaction", that is, such a process as when two products arise from decomposition of a material sensitive to light, the sensitive material in this case being the visual purple. This decomposition or breaking up of the photosensitive substances by light forms the first step in the receptor processes. We assume that these sensitive substances break down into two products as a result of the protolysis, and that in the dark they unite again to form the original sensitive material, thus giving a reversible reaction. It is the writer's belief, based on clinical observation, that these phenomena are basically related to certain clinical types of amblyopia.

With present methods of testing dark adaptation, doubt may arise as to the correctness of the modus operandi and the value to be attached to the results. Do light sense tests, as usually applied, give correct indication of the state of the light-sense fusion? We should obtain the expressions of the paramacular and peripheral regions which more truly express dark-adaptation values. We should attempt to avoid readings that do not fully express those values of function which we desire to obtain. Our tests may show a mixture of the strictly visual function with the light-sense function secondarily associated, rather than indicate the peripheral retinal function, where the strictly visual function is secondary. Our central retinal region is more largely visual than light discriminating, although there still resides even here some of the grosser and more primitive function of dark adaptation.

Preliminary to the test for dark adaptation, the eyes should be in darkness for considerably longer than the period usually employed. In whatever type of photometer is used calibration is an important consideration. Another detail must receive attention—the elimination of macular fixation toward the first incoming source of light. This may be obtained by having the eye fix toward a point thirty to forty-five degrees to one side of this point. This scheme may be carried out by a simple apparatus, on the principle of the Förster photometer. The apparatus should be so constructed that the lower part of the face may project under, and thus permit the eye under test to be well

within the edge of the opening. This permits of turning the eye in a direction away from the back of the box, from which the light stimulus first appears. The author has found this method simple and practical, and believes it gives better index of function than is obtained by the usual method of having the eye fix directly forward.

Calibration is essential for correct interpretation of comparative values and relationships of reports of different observers. Different apparatus may express different values, arising from different types of construction, varying degrees of illumination, and dissimilar methods of calibration. In this regard, it is not unlike the testing of the visual field under different light intensities, different degrees of saturation and size of test objects. In photometers the initial light stimulus may be the same, but, owing to differences in construction, there may be more absorption of this stimulus in one than in the other before it reaches that point where the light stimulus finally emanates. Again, differing calibration makes impossible the comparison of the thresholds of light perception. These remarks apply even more in photometric than in visual field tests. In the latter we obtain more nearly an average normal of light stimulation, since we are dealing with natural light. In photometric tests, where we are generating a light stimulus de novo, much depends upon correct calibration to insure that readings shall be actually and comparatively correct.

1111 Nicollet avenue.

SOCIETY PROCEEDINGS

Edited by Dr. Lawrence T. Post

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section on Ophthalmology

October 16, 1930

Dr. H. Maxwell Langdon presiding

Résumé of special inquiry on eye health in Philadelphia

Dr. Haven Emerson, of New York, after referring to the high standing of Philadelphia as an ophthalmological and medical center, recalled the fact that Philadelphia had led in making an extended study of the eyesight of school children as far back as 1878, under the chairmanship of Dr. Samuel D. Risley, and that a survey of lighting conditions in public schools had been conducted actively in 1875. Quoting from an editorial in the Philadelphia Press under date of September 20, 1878, Dr. Emerson pointed out how shrewdly Dr. Risley's survey committee had secured the cooperation of the press in preparing the minds of the public for this first study of the vision of school children. The work of Dr. Risley's committee was monumental and served as a guide all over America.

Dr. Emerson then reviewed the general hospital and health survey work of the city, pointing out how nearly every phase of that study had some lesson in it of value in eye health. He featured particularly the social hygiene survey and the notorious abuses of quacks and charlatans in taking advantage of the gullible, pointing out that Philadelphia was really a center for retail distribution of misinformation conducted on a scale not exceeded anywhere in America.

Subsequently, Dr. Emerson discussed in considerable detail the lack of complete reports by physicians and hospitals and from other sources of the occurrence of sore eyes in babies. He complimented particularly the work of the Visiting Nurse Society, in this as in all other phases of its work, and concluded his discussion with a strong plea that the eye section of the college should maintain a standing committee to cooperate with the Health League in securing adequate support for the city health department toward promoting a much needed extension of its eye health services and toward improving conditions so obviously needing correction in the public and parochial school systems.

Dr. B. Franklin Royer followed Dr. Haven Emerson and discussed in some detail the incompleteness of the dispensary records in practically every eye clinic where histories had been reviewed. He stated that with the aid of the ophthalmologists on the committee a sort of measuring stick was designed by using thirteen different conditions which all were agreed would require watchful care in the eye clinic and many of which would be likely to cause deterioration of vision if neglected. The ophthalmologists of the committee estimated the number of return visits that ought to be expected in each condition and the duration of treatment; then, with the aid of a well trained statistician and the complete cooperation of various persons charged with the responsibility for these records in the out-patient departments, some 738 records were reviewed and contrasted with the norm established by the committee. It was distressing to find such a tremendous waste of professional effort shown throughout all of these clinics. So large a proportion of the patients attended a totally inadequate length of time that the physician was given no chance to demonstrate what could be done by curative medicine, and a large proportion of the patients were lost to the clinic without showing what result, if any, had been secured. Many patients were found with serious eye conditions, such as in-

terstitial keratitis, phlyctenular keratoconjunctivitis, choroidal disease, or uveitis, with attendance continuing scarcely long enough to establish the diagnosis.

Out of the 378 cases reviewed, only four were recorded as having made the desirable number of dispensary visits. One of these was a case of tuberculous keratitis, one a case of iritis, one of disease of the choroid and retina, and one of glaucoma. Forty cases of corneal ulcer (ordinary abrasions not being included), 16 cases of interstitial keratitis, 33 cases of phlyctenular keratoconjunctivitis, 21 cases of iritis, seven cases of uveitis, 54 cases of disease of the choroid and retina, six cases of papillitis, two cases of papilledema, 26 cases of optic atrophy, and 12 cases of glaucoma made but a single clinic visit each.

The point brought out by the speaker was that the efforts of ophthalmologists were largely wasted unless a trained medical social worker served as go-between to interpret to the family the scientific lesson which the doctor wished to impress, but in language the patient might readily understand, and to see that those family adjustments were made which would permit return appointments to be kept until such time as the doctor had had an opportunity to treat the condition adequately.

The lighting conditions in the public and parochial schools, and the shade adjustments, were discussed in considerable detail, emphasis being placed upon the fact that in some of the public schools today Philadelphia was found to be tolerating lighting conditions that were severely condemned by the survey group in 1875. It was pointed out that in some of the newer school buildings there was need of eliminating windows in the front of the room which were the source of annoying glare: that window shades at the time of the survey were almost universally of the single roll type hung from the top of the window, instead of double, hung at the middle, one rolling up and the other down; and that the old-fashioned method of arranging desks with the left side parallel with the windows existed, with most of the desks fastened to the floor in this manner, while the modern school practice was for the desks to be so oriented that the pupil faced a little toward the inner front corner of the room rather than toward the straight front wall, in order to bring light properly over the left shoulder and to prevent glare in the eyes of those seated in the rear rows near the windows.

On behalf of the survey committee doing the work, as well as of the National Society for the Prevention of Blindness, Dr. Royer expressed great appreciation to hospitals, dispensaries, and other agencies in the city for their splendid cooperation. Everybody had helped.

Mrs. Winifred Hathaway reviewed the survey of the rooms in which sight-saving classes were conducted, and of the equipment found in use, and pointed out that through economies in utilizing buildings not available for other purposes some gross faults had been tolerated. She featured the fact, however, that after the survey nearly all of the serious faults had been speedily corrected. She pointed out the need for ophthalmologists to keep in closer touch with the activities, customs, and practices of the sight-saving class, both for the purpose of encouraging and guiding the teacher and in order that the practicing oculist might know more about the advantages of the sight-saving class.

Dr. L. C. Wessels (by invitation) gave a résumé of the work done in the eye clinic at the Philadelphia City Hall.

A. G. Fewell,
Secretary.

BROOKLYN OPHTHALMOLOGICAL SOCIETY

October 23, 1930

Dr. John N. Evans, president

Occurrence of eye lesions in tuberculous patients

Dr. Walter V. Moore read a paper on this subject which will be published in full in the American Journal of Ophthalmology.

Melanotic sarcoma of choroid

DR. HARGITT reported the case of Robert B., printer, aged forty-seven years, seen on June 15, 1927, complaining of blurring of vision for the past three weeks. He had never worn glasses. The vision of the right eye was improvable to 20/25 and that of the left eye was 20/15. Media clear, eye-grounds normal. In April, 1928, patient complained of increasing difficulty in the use of his eyes. The vision of the right eye was now improvable to but 20/70, the left as at the previous examination. The right eye-ground showed a fairly large area of edematous retina above the disc, extending into the upper nasal quadrant, elevation four to five degrees; there was a corresponding scotoma in the lower temporal field. A tentative diagnosis of choroiditis or neoplasm was made with an inclination to the latter because of the degree of elevation.

General study was practically negative. Several questionable teeth were drawn. Increasing doses of potassium iodide were prescribed, and six weeks later vision had improved to better than 20/40, with a definite reduction in the size of the scotoma. In September, 1928, improvable vision had again dropped to 20/70 and the retinal edema had increased so as almost to surround the disc. Several more questionable teeth were drawn within the next few weeks. In November the vision was reduced to 20/200 and a large retinal detachment involved most of the lower field. The patient was advised as to the possibilities. At the next observation, June, 1929, vision was limited to the counting of fingers at one foot and this gradually became reduced to bare light perception, with an increase in the size of the detachment. Early in December, 1929, the patient reported a dull ache in the eye and tension was somewhat elevated, but he would not submit to enucleation until several weeks later, when the eye was markedly injected, tension high, and he was suffering intense pain.

The pathologist reported a flat melanotic mixed-cell sarcoma surrounding the disc, and on one side of the nerve the ciliary vessels were surrounded and partially obstructed by masses of tumor cells.

Ancient ophthalmological writings

MR. CHARLES FRANKENBERGER, librarian of the Medical Society, County of Kings, in some remarks introductory to an account by Dr. Ralph I. Lloyd of "The ten treatises on the eye", ascribed to Hunain Ibn Is-Haq, commented upon the recorded writings of ancient writers on ophthalmology, from the time of the Assyrio-Babylonians (2250 B.C.), when frequent reference was made to ophthalmology in the collection of laws known as the Code of Hammurabi, carved in stone, down to the seventeenth century. These remarks were accompanied by an exhibit of books in the possession of the library, in all of which mention was made of ophthalmology.

"Ten treatises on the eye"

DR. RALPH I. LLOYD reviewed the contents of the book of the "Ten treatises on the eye", ascribed to Hunain Ibn Is-Haq (809 to 877 A.D.), the best known of the Arabian ophthalmologists between the eighth and fourteenth centuries, who had given us the earliest treatise on diseases of the eye.

The three posterior coats of the eye, and the conjunctiva and the cornea, are well described. The author describes the ice-like structure, the lens, and states that it is located at the middle of the eye with an albuminoid in front of it and an ice-like humor behind it. The iris is said to nourish the cornea, separating the lens from the cornea to prevent injury to the former, and concentrating light because of its color. There are said to be two nerves going to the eye from the brain; one is soft and hollow, the optic, and the other is hard and effects the motion of the eyes and the lids.

The author ascribes vision to a spirit which originates in the eye and runs thence through the air to what is looked at, and denies the theory that any spirit could emanate from the ob-

ject looked at because "If 10,000 persons looked at one object, how could enough spirit emanate to impress all the onlookers?" The visual spirit goes from the eye by way of the hollow optic nerve and the accepted reason for the chiasm is to allow the visual spirit to flow into the other eye if one is affected. Cataract is described as a coagulation of moisture in the pupil that prevents the lens from meeting the external light; it is curable by couching and the test by which it is shown whether operation will be successful or not consists in shutting one eye, when, "If you see that the pupil of the other is dilated, you know that it will see after the operation, and if it is not dilated after shutting the other it will not see after the operation". The reason for this is: "The missing dilatation of the pupil indicates that the duct of the optic nerve through which the light comes forth is obstructed". The operation of couching is described in rather general terms and the operator is warned not to pass the needle between the corneal layers.

The Arabian oculists were far ahead of their Christian colleagues, and it is said that the proficiency of the Arabs in this specialty did not find an equal degree among the Christians until about 700 years later.

GEORGE FREIMAN,
Associate Secretary.

LOS ANGELES COUNTY MEDICAL ASSOCIATION

Eye and Ear Section

November 3, 1930

DR. A. RAY IRVINE, president

Exenteration of the globe

DR. CLIFFORD WALKER presented a patient upon whom he had done an exenteration of the contents of the globe according to the technique of Dr. Harold Gifford. A horizontal incision with a Graefe knife had slit the globe from ciliary region to ciliary region. The contents had been carefully removed and a pressure bandage had been applied. A prothesis had been fitted on the third postoperative day. The cosmetic result was very good. The contents of this globe had become calcified and Dr. Walker demonstrated the calcified lens and choroid.

Discussion. DR. HAROLD WHALMAN asked whether the deposits in the eye were calcium or true bone.

DR. A. RAY IRVINE asked whether a ball had been implanted within the sclera.

DR. GEORGE MCCOY inquired whether this procedure might not better be termed evisceration.

DR. M. F. WEYMANN inquired as to the comparative course of healing between this operation and the usual evisceration where the cornea was removed.

DR. WALKER replied that the deposits had undergone calcification, and that no implant had been made into the sclera. Healing had occurred much more quickly and with less reaction than in the usual evisceration, because no raw surface remained to heal by granulation in Gifford's procedure.

Heterophoria and squint

DR. JOSEPH MCCOOL (by invitation) presented a paper entitled, "The management of certain phases of heterophoria and squint". On account of the great amount of detail presented in Dr. McCool's excellent paper only a few outstanding points can be mentioned.

The reaction between refraction and motor anomalies was stressed and numerous slides were shown with a discussion of the physiology and anatomy of the ocular muscles.

Dr. McCool uses the monocular occlusion test in patients where more than one-half degree of hyperphoria, four degrees of esophoria, or two degrees of exophoria for distance are found with the Maddox rod. In some cases of esophoria a reading correction of one-half diopter more than the total hyperopia found under a cycloplegic is prescribed. In determining the strength of the internal recti he prefers to use the convergence near point rather than the prism

convergence. Prescription of prisms is unsatisfactory in esophoria but they are used in exophoria and hyperphoria. Exercise does not seem to change the amount of exophoria, but by increasing convergence power with prisms one may relieve the symptoms.

One should always consider the general condition of the patient and look for such specific diseases as tabes, paresis, multiple sclerosis, and encephalitis in treating cases of muscle imbalance. The operation of choice for heterophoria, where operative treatment is indicated, is the O'Connor method.

In young children with squint, use of the amblyopic eye is urged as early as possible. Here also the O'Connor technique for operative correction is used.

M. F. WEYMANN,
Recorder.

LOS ANGELES COUNTY MEDICAL ASSOCIATION

Eye and Ear Section

December 1, 1930

DR. A. RAY IRVINE, president

O'Connor operation in strabismus

DR. HANS BARKAN, professor of ophthalmology at Stanford University medical school, presented this paper by invitation. He said that Dr. O'Connor had got the idea for his operation from a method of shortening saddle girths used in the Philippine Islands. In the past year and a half Dr. Barkan had operated on over one hundred cases by O'Connor's method. This method has the advantage that operation can be done early and that it is necessary to keep only one eye bandaged. In cases of squint, spasm in the stronger muscle often leads to actual fibrosis. Where first degree fusion is present, less operative correction is necessary than where there is no fusion. In many cases, when operated on early, third degree fusion may be developed after only a dozen exercises. The cover test should be used to detect cases of "false macula", because if these are operated on diplopia may be produced, although a satisfactory cosmetic result is obtained.

In using the O'Connor operation to correct phorias, overcorrection is always done. On the second or third day enough strands of the dermal suture are removed to produce orthophoria with the Maddox rod test.

Investigation upon rabbits has shown that the dermal strands produce a marked leucocytic infiltration in the tendon during the first six days. This leads to the formation of a strong scar. Therefore this material is the best obtainable for the purpose.

In patients in whom the strabismus amounts to over thirty degrees, two operations are usually necessary.

The technique of the operation was demonstrated by an excellent motion picture. It consists, in brief, of placing the O'Connor hitch in the muscle to be shortened, with a partial myomectomy of the stronger antagonist. The dermal strands are left in position for about three weeks.

Discussion. DR. WILLIAM BOYCE stated that a recent tour of several eastern clinics had yielded a great variety of opinion as to which strabismus operation was most satisfactory. He cited several instances in which there was no agreement as to method. He concluded that the best operation for any individual was that with which the operator was most successful, but that the O'Connor method was worthy of trial.

DR. M. F. WEYMANN said that he had used the Reese resection for the past five years but that the O'Connor operation seemed to accomplish the same result without the necessity for sectioning the muscle. A stray suture fastened to an applicator which was fixed near the outer canthus by means of adhesive plaster had increased the effect obtained about five degrees where the internal rectus had been set back, In esophoria with a convergence excess it was preferable to do a recession upon the internal rectus, because this was the muscle at fault. The operation of O'Connor might be further simplified by closing the conjunctiva with a running suture as advocated by Burch.

Dr. Lloyd Mills remarked that his results by the method which he now used were perfectly satisfactory but that he thought it worth while to try the O'Connor operation in a series of cases and he intended to do this. At present he corrected the phorias by tucking.

Dr. Lemere asked if the least possible amount of tuck obtainable was not six degrees.

Dr. George McCoy asked if the subjective symptoms were relieved after the operative correction of hyperphoria.

Dr. Eugene Lewis asked if the dermal strands produced any conjunctival irritation.

Dr. Julian Dow wished to know the size of dermal suture used.

Dr. A. Ray Irvine stated that he had performed the O'Connor operation as originally described but had abandoned it because he obtained such a large granuloma at the site of the hitch. He was glad to know that this no longer occurred with the new procedure, using dermal suture material.

Dr. Simon Jesberg asked for an exact explanation of the insertion of the suture.

Dr. Barkan, in closing, said that, although the conjunctival sutures usually came out by themselves, a running suture might prove better as it could be easily removed. Medium dermal suture was used and caused no irritation of the conjunctiva. When hyperphoria was corrected properly the symptoms were relieved. Dr. Barkan then demonstrated by means of diagrams exactly how the O'Connor hitch was made in the tendon.

M. F. Weymann,
Recorder.

ROYAL SOCIETY OF MEDICINE, LONDON

Section of Ophthalmology

November 13, 1930

Mr. Leslie Paton presiding

Vascular tumors of the brain and spinal cord

Dr. A. Lindau (Sweden), speaking from the neurological standpoint, said that in the first group a systemic disorder could be distinguished, trigeminal nevi, homolateral pial angioma showing calcification when examined by x-rays, and a unilateral buphthalmos or glaucoma forming together a characteristic syndrome. The second group was composed of the hemangioblastomas, and the favorite site was the hind brain and spinal cord. They might be either solid or cystic. In obscure cases Perdrau's staining was of great value.

Mr. E. Treacher Collins dealt with the ocular manifestations of these tumors. He said that congenital ocular hematogenous formations occurred in connection with both the retinal and the ciliary vessels. Those of the retinal vessels could be divided into two classes, like those of the brain described by Cushing and Bailey: (1) the ones composed of fully formed blood vessels, which, they said, should scarcely be regarded as tumors, and termed "angiomatous formations"; (2) those composed of the cellular elements of blood vessels, which might without equivocation be regarded as neoplastic, and could appropriately be called "angioblastomata". In the retina the first class presented itself as an unusual tortuosity or abnormal branching of fully formed vessels, which remained indefinitely unchanged and were unaccompanied by visual disturbance. The second class, the angioblastomata, presented the strikingly characteristic appearance of a raised mass at the periphery of the fundus, composed of rudimentary capillary vessels and endothelial cells to and from which an enormously enlarged companion artery and vein passed. In it the affection was always progressive, and resulted ultimately in complete loss of sight.

The first class (those showing tortuosity of the retinal vessels) might occur without angiomatous formations elsewhere, or in association with angiomata of the skin and mucous membranes, and sometimes also with epileptic or other symptoms suggesting the presence of an angiomatous mass pressing on the cerebrum. The second class, the angioblastomata, could be as

Lindau had first pointed out, associated with cystic angiomatous growths in the cerebellum; and, said Mr. Collins, just as the recognition of this condition in the eye had aided in the preoperative diagnosis of an affection of the cerebellum, so the recognition of the presence of tortuosity of the retinal vessels might aid in the preoperative diagnosis of a case exhibiting symptoms of pressure on the cerebrum. Tortuosity of the retinal blood vessels was sometimes, he said, associated with recurrent attacks of epistaxis, due to the presence of vascular nevi of the nasal mucous membrane. Mr. Collins suggested that an angiomatous condition of the retinal blood vessels might account for the recurrent attacks of intraocular hemorrhage met with in young men in association with recurrent nosebleed, a condition first described by Eales, who noted that in all of his cases "the retinal veins at the periphery were found to present remarkable corkscrew-like tortuosities".

The retinal or cerebellar angioblastomata were neoblasts of mesoblastic tissue growing in an epiblastic structure. In association with the rudimentary capillary formation some proliferation of the perivascular endothelium was often met with, the cells being loaded with fat globules. In rare cases the endothelial new-growth preponderated over the vascular formation, what was termed a hemangioendothelioma being produced.

The characteristic ophthalmoscopic appearance of an angioblastoma of the retina was due to the retinal arteries being end arteries. Hemorrhage from these growths frequently occurred, the blood collecting in the substance of the retina, in the vitreous chamber, or between the retina and the choroid. Fibrous tissue replacing blood clots in the vitreous, or between the retina and the choroid, gave rise to the conditions described as "retinitis proliferans" and "massive exudation", often met with in connection with these growths.

The angiomata which were met with in the choroid were usually of the cavernous type, and in eyes so affected detachment of the retina and glaucoma nearly always ensued. They were associated with vascular nevi of the skin of the face, and in many of the recorded cases the inner surface of the growth in the choroid had been found encapsulated by a fibro-osteogenetic membrane. In intracranial angiomata situated above the tentorium, Parkes Weber and others (radiographically) had found the surface of the growth to be bounded by a membrane giving a dark shadow, which, Mr. Collins suggested, was probably osteogenetic, like that found in the eye.

The anterior ciliary blood vessels on the surface of the eyeball sometimes participated in an angiomatous formation involving the skin of the face. More frequently some disturbance was met with in the circulation of the intraocular fluid, resulting in increased tension of the eye, and in young children in buphthalmos. Cushing had recorded three cases of spontaneous hemorrhage with trigeminal nevi and buphthalmos on one side, and contralateral epileptic symptoms. Parkes Weber collected eight cases of unilateral buphthalmos with cutaneous and cerebral, not cerebellar, hemangiomata.

The debate was mainly on neurological lines (with the exception of Mr. Collins' paper).

(Reported by H. Dickinson.)

COLORADO OPHTHALMOLOGICAL SOCIETY

November 15, 1930

DR. WILLIAM M. BANE presiding

Double penetrating wound

DR. R. W. DANIELSON (by invitation) presented a sixteen year old boy, a patient from the Denver General Hospital, who had been shot through the left eye with a lead shot two weeks previously. The missile had penetrated the lower lid, then the eyeball about 3 mm. below the limbus. It was localized by x-ray in the lower part of the temporal fossa behind the antrum. It had evidently passed out of the orbit and

through the inferior orbital fissure, as no fracture was demonstrable.

At first examination the anterior chamber was full of blood and there was marked chemosis. Striped keratitis had developed soon after the injury and had persisted to the present time. Under atropin and hot fomentations the pupil was now barely visible. Vision was light perception. There had been very little pain and no increase in tension. Some pain on chewing had been the boy's chief complaint. Unless complications arose enucleation was not contemplated.

Discussion. Dr. W. H. Crisp pointed out that not only the penetrating injury per se should be considered but also the contusional effect from a relatively large foreign body at high velocity. Much harm might be done to the structures within the globe by the contusion, and there was also a possibility of secondary rise of tension. Because of the danger of secondary rise of tension, it was not his practice to start atropin on a contused eye as was usually advised, but rather to use pilocarpin.

Dr. E. R. Neeper stated that it was a question of judgment in these cases whether or not to use atropin. He was guided by the evidence at hand, that is, the condition of the aqueous, the iris, and the question of exudation.

Dr. J. A. McCaw, on whose service this case was admitted at the Denver General Hospital, stated it was at his suggestion that atropin was used in this eye, in order to keep the eye at rest and to relieve pain.

Ayerza's disease

Dr. R. W. Danielson also presented a man, forty-five years of age, who had Ayerza's disease. The outstanding clinical features of this disease are given by Cheney as "chronic cyanosis, dyspnea, erythrocytosis, somnolence, prominence of the pulmonary artery in the roentgen ray, and right ventricular preponderance in the electrocardiogram".

In this man there was marked bluish redness of the conjunctiva of each eye, especially the left. With the biomicroscope the discoloration was seen to be due to a myriad of dilated blood vessels rather than to hemorrhage. There was some pigment on the anterior capsule of the left lens from an iritis six months previously; many fine, white, scintillating floaters of the vitreous of the right eye; extreme tortuosity of the arteries and veins of the fundi, with increased blueness and size of veins; increased redness of the discs, which were otherwise normal except for slight blurring of the nasal side of the left disc; no exudates or hemorrhages of the retina; visual acuity (with small correction) O.D. 5/5, O.S. 5/6.

Dr. Danielson believed that the previous iritis had been an extreme congestion of the iris vessels with exudation, rather than any definite infection. To get dilatation of the pupils homatropin was used; ephedrin and cocain were only slightly effective.

Explosion of a prothesis

Dr. Danielson's third case was that of a young girl who, while in school, was frightened by a loud report and some pain in the orbit on the side corresponding to her prothesis. The prothesis was removed with some difficulty. When she returned to the out-patient department of the University of Colorado school of medicine the next day, the prothesis showed a half-moon-shaped defect at the back, and the missing piece was lying free inside the cavity of the prothesis. There was considerable hemorrhage under the conjunctiva.

This girl's eye had been removed two months previously because of glaucoma following surgical release of traumatic anterior synechiæ. A gold sphere had been used as an implant. The convalescence was normal except for profuse lacrimal secretion for several weeks. Two days before the explosion she had complained of irritation of the conjunctiva, but no abnormality of the prothesis had been found.

Discussion. Dr. Melville Black quoted a prothetic technician saying that the explosion of a prothesis was

usually due to a sudden change in temperature, and that the use of a prothesis was advisable after the third day following an enucleation; also that the prothesis should be worn day and night, as much less secretion was thus produced.

Dr. E. R. Neeper stated that it was his practice to place a prothesis in the socket immediately after an enucleation, provided there was no special contraindication.

Pterygium

Dr. W. C. Finnoff brought Mrs. W. H. S., aged fifty-six years, who had been operated on thirty-two years ago, presumably for a pterygium on the left eye. Following the operation the eye had cleared up for many years and had remained stationary until about a year ago, at which time the vision of the left eye became poor.

Appearance of the eye: an extensive pterygium covered the inner and lower portion of the cornea of the left eye from a point opposite four o'clock on the temporal side to ten o'clock nasally. The nasal portion of the growth reached the edge of a 3 mm. pupil. Just above the lower margin of the pterygium the cornea was grayish-yellow in color, the appearance resembling that of an early hyalin change in the superficial layers of the corneal stroma. The opacity was about 4.5 mm. long and 1 mm. wide.

Discussion. Dr. M. Black suggested the use of the thermophore in this case, and Dr. Finnoff said that it would be given first consideration.

Chronic conjunctivitis

Dr. M. Black showed Mr. C. Z., aged twenty years. He had been having trouble with his eyelids for more than ten years. For the past month his eyes had been bothering him at intervals, and he had had the present acute attack for three days. Tearing and sensitiveness to light were the predominant symptoms. He had been working in a sugar beet factory, and his extreme photophobia and present symptoms had previously been attributed to something that Mr. Z. had come in contact with in his work.

He had had several attacks of eczema, so severe that he lost the hair from his head. He also had had several attacks of blepharitis. He was in an accident two years ago, and suffered a skull fracture which caused a paresis of the left side of his face; for a time he could not close the left lid.

Examination: The pupils were dilated (atropin) and there was extreme photophobia and lacrimation with marked injection of palpebral and ocular conjunctiva. No follicles were noted. There was no pigment on the anterior capsule. No abnormalities of the cornea existed. The fundi could not be examined. The cornea did not stain with fluorescein.

Discussion. Dr. W. A. Sedwick mentioned a case in which allergy was a deciding factor and the symptoms cleared up immediately under treatment on this basis. He described another case in which a submucous resection had alleviated all symptoms.

Dr. Edward Jackson thought phlyctenular conjunctivitis a possibility and stated that glycerole of tannin was helpful in these cases. He described the method of the late Dr. Ziegler at Wills Eye Hospital, whose custom it was to apply glycerole of tannin to the nasal mucous membrane. The question of allergy should certainly be investigated.

Dr. W. H. Crisp was surprised that a careful refraction had not been done in this case, although he would expect the refractive error to be only a contributing factor. Hyoscyamin would perhaps be advisable as a cycloplegic in this case. He also mentioned the possibility of citrous fruits being responsible in these cases of eczematous character.

Dr. E. B. Swerdfeger recited a case in which tomatoes were the cause of the allergic phenomena. He also urged investigation of the sinuses in all of these cases of chronic conjunctivitis.

Dr. E. E. McKeown asked if litmus paper had been used. If the reaction was acid, alkaline washes were indicated.

Bilateral enucleation

Dr. W. M. Bane reexhibited K. M., aged two years and three months. He had been presented at the January, 1930, meeting of the Society, when the consensus of opinion was that the child was suffering from bilateral retinoblastoma. The condition was first discovered in September, 1929, but no definite diagnosis was made at that time. The right eye was enucleated January 25, 1930. The laboratory reported that the eye contained a tumor. The other eye was enucleated February 8, 1930. A gold sphere was implanted in the left orbit, nothing in the right. The laboratory diagnosis was "true retinoblastoma each eye, but not extending beyond the limits of the eyeball". The child's general health had been quite good since.

Dendritic keratitis?

For Dr. G. L. Strader, Dr. Hugo Lucic showed Mr. J. L., aged thirty-four years. The history given was that while at work under a mill floor in December, 1922, dirt or sand had dropped into his eyes. Two days later his eyes were very sore and he had to leave his work. His doctor removed some sand from his eyes but the condition got worse. He was treated for about a year, at which time his eyes became worse again. He was treated for a short time with some improvement, but his eyes had not been well since the accident.

In July the patient first came to Dr. Strader complaining of blurred vision and photophobia. Vision at that time was: R. E. 20/100, L. E. 20/100 with correction. On examination the left eye presented a fan-shaped thin conjunctival growth extending from the twelve o'clock position, with the apex reaching the upper margin of the pupil. The entire cornea stained superficially and irregularly with fluorescein. Similar superficial lesions were observed on the right cornea. The sensitiveness of each cornea was greatly diminished. The corneal lesion changed in shape and extent from day to day.

Corneal inoculation in rabbits showed similar lesions, but this was not convincing on account of the spontaneous epidemics which occurred in these animals. Sneezing was invariably precipitated upon examination of the eyes. The lids showed some scarring that suggested old trachoma. Dionin and quinine hydrochloride with nasal treatment proved to be more effective than any other form of treatment tried.

Discussion. Dr. W. H. Crisp suggested, from the sneezing of the patient, that the nasal condition might be responsible. He recalled a case of trachoma in which the nose was treated and all of the clinical evidence of the trachoma entirely subsided.

Dr. W. C. Bane used 1 to 500 bichloride solution in trachoma and in chronic velvety types of conjunctivitis. He wound a firm swab and rubbed the solution thoroughly into the conjunctiva to the point of bleeding. He had had excellent results with this procedure.

Unrecognized astigmatism

Dr. Edward Jackson reported the case of a man of sixty years in whom, within the last year, good oculists had failed to recognize eight diopters of mixed astigmatism. Correction brought the vision up to 0.9. The other eye had been enucleated. The sight in the remaining eye had always been decidedly poorer than that of its fellow. There was a slight haziness of the lens and cornea.

Donald H. O'Rourke,
Secretary.

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"SIGHT" FOR THE BLIND

From the rear of the lecture room a shepherd dog walks toward the platform. He wears a harness with a U-shaped bridle extending stiffly upward and grasped by the hand of a young blind man. As the steps are reached the dog sees that his master is going too far to the right so he pulls strongly to the left, and the man turns in the same direction and mounts the steps to the platform. This is Mr. Morris Frank with his dog "Buddy".

Mr. Frank lost his sight when fifteen years old. In Switzerland he came into contact with an association by which dogs were being trained to help the blind, and he was tremendously impressed. Therefore he determined to introduce such a training school in America.

This establishment was started several years ago now, in Nashville, Tennessee. Shepherd dogs were chosen because of their intelligence, docility, dependability, size, and general trustworthiness. Training begins at from twenty-one months to two years and is in the hands of experts. The course is a long and arduous one, for not only must the dog be taught but so also must the prospective owner. The demand for these animals has far surpassed the supply. Last year thirty-five dogs were trained at Nashville, but this year about sixty will be turned out.

The organization is run on a philanthropic basis, and dogs are sold for whatever the blind person is able to pay, ranging from twenty-five to three hundred dollars.

It is difficult to estimate the value of this help to the blind, but if we take the word of Mr. Frank his Buddy has almost accomplished the impossible of turning night into day.

Much has been done for the sightless in these later days; the general acceptance of English Braille is rapidly putting the best literature within their reach; the radio has brought music into their lives; but to a large extent they are still dependent and must await the

convenience of a friendly hand. For many the trained dog with his special harness may prove a means of independence in locomotion.

Laurence T. Post.

"THE ACADEMY"

By this abbreviation of its full name is widely, familiarly, and affectionately known the American Academy of Ophthalmology and Otolarynology, an agency so important, so powerful, so efficient, and so helpful in the progress of ophthalmology and the allied specialty of otolarynology that it has become not only a national but an international institution. Its international character is shown by the recent selection of a Canadian ophthalmologist as president-elect.

This organization is far from hiding its light under a bushel, but, if there are any to whom its merits are unknown, we delight in calling their attention to it. It is now thirty-five years since this society was organized under another name, namely as the Western Society of Ophthalmology and Otolaryngology, and it is about twenty-five years since its name was changed to the present one. It has grown in size, in influence, and in material prosperity until it is now the largest special medical society in the world and the most wealthy. It has blazed many new trails and, thanks to a group of earnest, hard-working, far seeing men, it has developed some new ideas in the activities of medical societies.

Among the many excellent plans for increasing the usefulness of "The Academy", none has met with greater favor than that of the Section on Instruction, devoted to "tabloid" courses of post-graduate instruction, splendidly arranged and most acceptably given to groups small enough to lend an intimate and informal character to each period. The most recent addition to this course is the intensive work in practical pathology and pathologic histology, a course necessarily limited to a small number, and which was oversubscribed for, practically by return mail, when the notices of it were issued.

Nor should we forget the part the Academy played, in conjunction with the other national special societies, in founding the examining boards for ophthalmology and otolarynology, which have functioned so successfully and which have contributed greatly to a sort of standardization, and a popularization of that standardization of the preparation for special work.

It may be unusual to single out one society for editorial praise, and these remarks are not to be taken as a disparagement of other special societies, each doing splendid work in its own field. But the Academy stands out as the big, democratic organization, diagnosing accurately our needs, and meeting them in a most efficient way.

The material prosperity of this society has enabled it, for the past several years, to foster research, and in the furtherance of this aim it has been fortunate in securing workers of the very highest type. It is a credit to all of us that such an organization has been built up, and it is a cause for congratulation to all that we have access to its splendid facilities. It lives up to the circus advertisement, in that each year it is "bigger and better", and we wish Godspeed to the officers and members, that they continue the good work.

E. C. Ellett.

SQUINTING MADONNAS

The popular prejudice against the wearing of glasses is no doubt based in large part upon the feeling that the eye is the most essential detail of physiognomy and facial expression and that covering the eye with spectacles disguises the appearance of the wearer. Parents are particularly given to admiring the "beautiful eyes" of their children, and about the eye of childhood there is a brilliancy which is usually lost in later life. The pupil is a deeper black, the iris color is purer, and the bluish white of the sclera is not yet tarnished by the more conspicuous conjunctival bloodvessels which are more characteristic of later years. Moreover,

in the young child the upper lid is raised so as to show practically the whole cornea as well as more of the sclera, whereas in the older subject the lid descends to cover often as much as one-fourth of the diameter of the cornea and therefore also of the iris.

It is necessary for the portrait painter to make a close study of all these peculiarities of the eyes at different ages; and similar details may with advantage be given close attention by the professional photographer when he finds it necessary to resort to retouching.

The various ancient superstitions surrounding the "evil eye" were probably based upon the sense of discomfort or disgust produced by departures from normal ocular appearance; and many a so-called witch probably owed her reputation to a "cast" or a leucoma or a lid deformity.

In this country we are disposed to feel that any abnormality in balance between the direction of the two eyes calls for correction by operation or glasses. It is surprising to find that this attitude is much less common in European countries, and the writer was once amused by hearing an English eye surgeon express admiration for the "piquancy" of facial expression created by a moderate convergent strabismus.

Reitsch (Zeitschrift für Augenheilkunde, 1930, volume 72, page 197) remarks that we have the impression of a squint when the optic axis either actually deviates or appears to deviate from the fixation point. How do we judge the position of the eyes or the deviation of the optic axes? According to the angle which the optic axes form with an imaginary plane passing vertically and sagitally through the head and the nose. We estimate this angle by the shape of the cornea and the distribution of the white scleral areas.

The shape of the cornea becomes elliptoid when the eye is turned sideways, but the more important factor in our judgment of ocular deviation is the unequal distribution of the white scleral areas. We know by experience that eyes which in the primary position manifest nasal and temporal white areas of equal width are straight and are not squinting; and in other positions of the eyes the same impression is conveyed by a homonymous congruence in the distribution of the white areas. Any departure from this equality or homonymous congruence gives the keen observer the impression of squinting.

There is also a form of apparent squint which depends upon abnormal relative position of the cornea and palpebral fissure. If in the primary position the cornea in one or both eyes lies laterally in the palpebral fissure, we have a distribution of the white areas which runs contrary to our experience of the normal and which gives the impression of squinting, even though there is no deviation of the optic or visual axis, and no enlargement of the angle gamma.

Examples of apparent but not actual squint are to be found in cases of epicanthus, in which the white areas on the nasal sides are diminished in width, so that a moderate convergent strabismus is simulated. On the other hand, careful observation will show a relatively significant number of patients in whom the fact that the temporal canthus lies nearer to the limbus than the nasal canthus simulates an outward deviation of the eyes. In old people the frequent narrowing of the palpebral fissure at the temporal end causes the same effect, and in a smaller number of cases the deviation is indicated by displacement of the palpebral fissure itself, either inward or more rarely outward.

The impression conveyed by either actual or simulated squint is ordinarily more pronounced when the eyes are turned sideways, and is at its maximum when the cornea of one eye has just reached the canthus, while the other occupies about the middle of its fissure.

In some sculptures and paintings the impression of divergent strabismus is to be explained through this disturbance of the relative position of cornea and palpebral fissure. The effect of convergent strabismus is practically never encountered in art, aside from a few

cases of realistic presentation. According to Reitsch, two periods in art are characterized by a distinctly divergent position of the eyes, to the extent that this peculiarity is not without value as a criterion for estimation of date. In the works of these periods the artist was not attempting to produce the impression of a squint, but to give a spiritual quality to his portraits by slight divergence of the eyes, although the effect was often overdone.

Hugo Magnus has devoted special attention to the position of the eyes in art. In his lecture on the physiognomonic significance of the eyes he says: "If both eyes are carried farther than usual toward the outer angle, if the axes of the eyes diverge, as the specialist says, this is to be regarded as the sign of a contemplative spirit, lost in thought. Donders found a divergent position of the eyes to be a constant quality of persons who were reflecting deeply. And painters use this position of the eyes to give their figures the expression of a mood of detachment from earthly things, concentrated on higher spiritual aims. The Sistine Madonna shows this divergent position of the eyes in a very pronounced fashion, and so does the gracious figure of a boy which she carries in her arms." "This divergent position of the eyes is also not rarely encountered in portraits; I have noticed it in Dürer's self-portrait in the Pinakothek in Münich." "In the Vatican, a bust of the famous philosopher in the purple, the emperor Marcus Aurelius, likewise shows such a divergent position of the axes of the eyes".

But Reitsch, whose article reproduces the heads of the Madonna and Child from the famous Sistine painting, finds fault with Magnus' reference to the "ocular axis", although entirely satisfied with that author's allusion to the divergent appearance of the eyes in both figures. Neither the Madonna nor the Christ Child in the "Sistine Madonna" presents true divergence, but only an apparent divergence, which the artist has created by skillful treatment of the white areas. In the head of the Madonna the effect of a diminished white area has been produced by shading of this area in the left eye, while in the head of the Christ Child the result has been obtained by bringing into relief the right nasal white field. Raphael even did not hesitate to displace the nasal part of the upper lid upward as though under the traction of scar tissue. But the eyes themselves are perfectly straight.

Of Dürer's self-portrait, according to Reitsch, it is also true that there is no actual divergence, but that slight divergence has been simulated by skillful coloring and shading of the cornea or iris. Dürer, however, did employ the actually divergent position in several other well known pictures.

In the Quatrocento (the fourteenth century, the period of the Prerenaissance) the apparent position of divergence was resorted to by a number of famous painters, including Luca della Robbia, Donatello, Mino de Fiesole, Rosselino, Settignano, and Benvenuto Cellini; and the practice was also followed in the Roman empire from the beginning of the second century after Christ (under the rule of Trajan) to the middle of the third century. About forty extant works of art from the Roman epoch show a more or less perceptible outward divergence of the eyes. According to Reitsch, an apparent use of this technique among the Greeks is to be found only in Roman copies and represents an unscrupulous modification by the copyist. This is the case with the Pallas Athene of Phidias, in the Berlin museum.

W. H. Crisp.

BOOK NOTICES

The world of the blind. By Pierre Villey, Professor of Literature at Caen University, France. Translated by Alys Halard. Cloth, duodecimo, 403 pages, no illustrations. Price $2.25. New York, The Macmillan Company, 1930.

Pierre Villey was born full-sighted but lost his vision at the age of four and a half years. He believes himself, however, to be in all respects precisely the

same as a person who was born blind. He remembers (as he believes) no sight of anything at all save that of some picture in a large Bible at his home. Of this he says: "It is rather a memory of vision than a visual picture." Strangely enough, a number of facts in this very book of Villey's disprove, though subtly, his own statement.

The volume is divided into four "parts", namely: the intelligence of the blind; the substitution of senses (converted by a ridiculous typographical blunder into "lenses") and the activity of the blind; the substitution of images and the furniture of the mind; indications with regard to the affective life; psychology of the blind in society. The most valuable portion of the book consists, as Janet in the preface points out, of those chapters in the third "part" of the volume which deal with the question whether space as appreciated by the blind man is the same as that of the man who sees. Hard indeed it is to overestimate the value of these chapters.

Other portions of the book are not quite so good. Especially bad is the author's attempt "to prove that, contrary to the opinion so widely spread, the blind man's intellect, intelligence, and personality do not differ from the intellect, intelligence, and personality of the man who has his eyesight". Many of the blinded, indeed, have informed me that, since the departure of their vision, they have, especially in certain fields of intellectual endeavor, experienced a very decided increase of power and keenness. My personal friend, Senator Thomas D. Schall, going even farther, declares that his blindness (acquired in early adult life) has so immensely stimulated and improved his intellectual and spiritual perceptions that he would not now depart from the brighter and better world of the late-blinded, even had he an actual opportunity to do so. Nevertheless one may plainly perceive, even from such very statements, that "the blind man's intellect, intelligence, and personality" do indeed differ from those of persons who have sight.

In some respects the book is decidedly unscientific. For example, it completely omits even the very slightest mention of the effects which blinding produces in the sex life of the blinded. On this head I have gathered a number of statements personally from young men who had lost their vision, and, from such documents alone one could easily know that the "intellect, intelligence, and personality" of no man or woman could possibly remain the same after the development of blindness.

Another decided weakness of the volume lies in its frequent failure to credit citations to authors, and to specify clearly the means whereby the author himself has obtained this or that fact.

Still again, Professor Villey does not sufficiently often tell us whether he is talking about the congenitally blind or the blinded, or about the merely blind or the both blind and deaf. Many years ago I suggested that we ought almost always to say, specifically, and in accordance with our precise actual meaning, "the born-blind" and "the blinded," the "merely blind" and the "more than blind". The latter should, of course, further, be subdivided into the "deaf-blind" and the "blind-deaf"—the former class consisting of those who were deaf before they were blind. Still more accurate terms would be the "born-deaf blinded", the "born-blind deafened", the "deafened-blinded", and the "blinded-deafened". Without precise terms there can be no accurate science.

The frequently unscientific character of Villey's volume is typically shown by a remark which its author makes in connection with certain experiments to determine whether or not there exists, either in the blind or in the sighted, a sixth sense—the so-called "sense of obstacles". This is the sense which gives (especially to the blind) due notice of the too great propinquity of walls, trees, posts and the like. It has been supposed by many to reside in the skin of the face and to consist merely of the sense of touch or of temperature or of both. Says Professor Villey, with regard to this sense: "Experiments which

I have tried on healthy subjects by painting their faces with a solution of cocaine gave no appreciable results." Of course they didn't. Long and universally it has been understood that cocaine is never absorbed through the unbroken skin.

All in all, however, this is a good and useful book. The translator's work is especially well done.

Thomas Hall Shastid.

Some experiments on peripheral vision. (Number 6 of the reports of the committee upon the physiology of vision, Medical Research Council of Great Britain.) By Myer Salaman. Pamphlet, paper covers, 47 pages, numerous figures, graphs, and tables. London, His Majesty's Stationery Office. Price 2s 6d., net.

This paper is a contribution to the study of some phenomena of vision by peripheral parts of the retina, and is divided into two sections. The first is concerned with the perception of movement and in particular with the conditions under which the successive exposure of the peripheral retina to two discrete stimuli arouses an illusory perception of movement. The second section, dealing with the perception of form, gives an account of some experiments designed to determine the conditions under which simple geometrical shapes can be recognized when viewed peripherally.

The threshold for perception of movement was found to depend entirely on the angular speed of movements for a given eccentric angle when such factors as angular size of the object, and relative intensities of illumination of object and background, are kept constant. Peripheral perception of movement seems to be an "all or none" phenomenon. It requires a minimum displacement less than the diameter of the smallest circular object visible at the same eccentric angle; but beyond this it is independent of displacement and depends solely on the angular speed. The peripheral perception of change of position is not determined by length of displacement as in central vision. The threshold for perception of both movement and change of position rises rapidly from fifty degrees outward. At speeds of 0.2 degree per second or less, change of position can sometimes be perceived further out in the periphery than movement. Salaman accounts qualitatively for the facts regarding perception of change of position by the very low visual acuity (lack of power of spatial discrimination) of the peripheral retina.

Previous knowledge and attitude entirely and fundamentally change the illusory perception of movement. Observers with previous experience obtained the illusion much more readily than those to whom the work was new. However, all the perceptions were of the vaguest description. At eccentric angles from zero to forty-five degrees real movement and illusory perception could always be distinguished; further out in the periphery the two perceptions were often confused; and at eighty degrees or over they could not be distinguished. These results are at variance with the conclusions of Dimmick and Scahill; they used only four observers, all of whom were psychologists. Optimum impression of movement was obtained with time intervals between about —50 and +50 sigmas between light exposures. This time factor was the only one of several experimental conditions that could be determined with any certainty, owing to the influence of psychological factors.

Parsons suggests that a mechanism analogous to Sherrington's "immediate induction" underlies the visual perception of movement, but Salaman's results show that the analogy must be a loose one. Nor does Wertheimer's theory of short circuits and potential differences fully explain the illusory perception of movement; the production of the illusion by two stimuli overlapping one another in time shows that "potential differences" cannot be the sole factor.

The peripheral perception of form is studied by two methods: (1) discrimination, in which the objects (lines, tri-

angles, squares, and so on) were first viewed by central vision; and (2) recognition, in which the objects were viewed peripherally only. It is shown that near the threshold for discrimination other characters besides geometrical form, such as differences of size and brightness, and direction of lines, are used to distinguish the objects. The thresholds for the three groups of objects differ only by small amounts, and the corresponding thresholds are of the same order between the observers. The thresholds fall gradually as the experiment progresses. The method of recognition revealed many varied and bizarre perceptions. Although the observer was assumed to have no knowledge of what he was going to see, it was very evident that certain general mental habits and specific preconceptions drawn from past experience influenced the perception of objects.

Periodic disappearances of the objects, lasting fifteen to twenty seconds or more, noted through all the experiments, are considered by Salaman to show a correspondence between the properties of the visual process in the eel, as studied by Adrian and Mathews, and the peripheral visual process in man; and this correspondence is much in favor of the view that human peripheral vision preserves much of the apparatus of more primitive types of vision. *George H. Stine.*

CORRESPONDENCE

Special licensure

To the editor: In the American Journal of Ophthalmology for November, 1930, appeared an editorial called "License for special practice". That leader, excellent so far as it went, did not go far enough in the matter of refuting objections to special licensure, and was not sufficiently emphatic and insistent.

For a number of years I advocated a special licensure in ophthalmology and in otolaryngology, and it may be interesting to some of your readers to learn of the chief objections which used to be filed to my proposals, as well as the answers which I was accustomed to make to those objections.

(1) A law for special licensure would be unconstitutional.

Answer: Such a law, if properly drawn, would be no more unconstitutional than the present laws for licensure in general medicine and for special licensure in dentistry. These statutes have been upheld as constitutional in every state of this country, and the Supreme Court of the United States has decided again and again that the power to regulate the practice of the healing art lies wholly within the jurisdiction of the several states and not at all within that of the central government.

(2) We already have the American Board for Ophthalmic Examinations and the American Board of Otolaryngology.

Answer: These boards have no legal power whatever to prevent anyone from holding himself out to the public as a specialist in their respective subjects. But the very object of the proposed special licensure is to prevent the practice of the specialties in question (that is, as specialties) by improperly qualified persons.

(3) But no one can be admitted to any worth while ophthalmologic or otolaryngologic society or association without first presenting to its officers a certificate from one or other of these two boards.

Answer: The question under discussion is not who shall be admitted to ophthalmologic societies or associations, but who shall be legally admitted to the practice of ophthalmology and of otolaryngology as specialties.

(4) But a full and sufficient knowledge and appreciation on the part of the laity concerning the great value and significance of the certificates which are issued by the two boards above mentioned will teach the laity to refrain from employing any so-called specialist who does not hold such certificate or certificates.

Answer: The laity will perhaps have such full and sufficient knowledge and appreciation in about the year 100,000

A.D.—or say when Hippocrates arises from the dead to bless us. Meantime, something legally binding is needed.

(5) There exists at present insufficient provision for systematic teaching of the branches in question.

Answer: That objection is quite as valid to the practice of ophthalmology and otolaryngology as now carried on as it is to the practice of the same branches under provisions for special licensure. Improperly taught specialists are equally undesirable in either instance. Further, I believe that under special licensure the systematic teaching of our specialties would be promptly and greatly improved.

(6) Other groups of specialists might not follow our example.

Answer: In popular phrase, "we should worry".

(7) We could never decide whether the special licensure should be for eye only, or for ear, nose, and throat only, or for all four combined.

Answer: The board could and should be authorized to license for eye only; for ear, nose, and throat only; or for all four combined. The members of the board could be some eye specialists; some ear, nose, and throat specialists; some specialists on all four branches. Or they could, if so preferred, all be eye, ear, nose, and throat specialists.

(8) To practice eye, or ear, nose and throat, or all four combined, a person should be required to possess a license in general medicine, as well as a mere special license for those particular branches.

Answer: Of course, and he would. Special licensure is not proposed as a substitute for general medical licensure, but as something additional to it.

(9) Dental laws and boards nowhere require the general in addition to the special license for the right to practice dentistry.

Answer: We other specialists are not obliged, either by law or by common sense, to commit a similar error.

(10) General practitioners ought never to be debarred (perhaps could not legally be debarred) from practicing to some extent eye, ear, nose, and throat. A certain amount of such practice is an absolute necessity in connection with general practice.

Answer: Of course. Nor have we the slightest intention of attempting to debar them from such practice. All that we wish to do is to debar them and everybody else from "holding themselves out" to the public as specialists on the eye, or on the ear, nose, and throat, or on all four branches, without special licensure. At the present time general practitioners, in some parts of the country, extract teeth with impunity. But let one of them hold himself out to the public as a dentist (tooth specialist) and see what happens!

(11) But most specialists do not at any time "hold themselves out", or advertise themselves, as specialists on any given subject. Would it not, then, be difficult to prove that any given person had "held himself out" as a specialist on, say, the eye?

Answer: Advertising has nothing in particular to do with the matter in hand. To call oneself a specialist on the eye, or to designate one's practice as "limited to the eye", would plainly constitute holding oneself out as a specialist on the eye. One without the proposed special license could hardly evade a prospective patient's plain question, "Are you an eye specialist?", or "Do you limit your practice to the eye"; yet, if he answered any such question affirmatively, he would be risking fine or imprisonment, and even cancellation of his general medical license.

(12) You never can get such laws passed, because their passage would be opposed both (a) by optometrists and (b) by general medical practitioners.

Answer: (a) Special licensure laws would have to exempt optometrists in the matter of spectacle-fitting—just as our general medical practice laws do even now. (b) Why should general medical practitioners object to special licensure? Such laws would permit general practitioners to engage in eye, ear, nose, and throat practice in the same manner as those practitioners now so engage. The very small class of general practitioners, chiefly in the

country and in tiny towns, who incidentally declare themselves to be specialists on eye, ear, nose, and throat is almost absolutely without legislative influence. A few general medical practitioners expect, at some time, to enter upon the practice of eye, ear, nose, and throat as specialties, and desire to do so without even a minimum of special preparation. The objections of this class should be ignored because it is particularly this class whom special licensure laws would quite properly debar from "holding themselves out" to the public as specialists. A little campaign of preliminary education would need to be carried out among general practitioners regarding the intent and purpose of special practice acts.

(13) It would be a hardship for those who long have engaged exclusively in some form of special practice to submit to special examination.

Answer: Nothing of the sort should be required. When general medical practice acts began to be adopted, physicians who had engaged in medical practice for a stated length of time had only to submit the proofs of such time of practice to become licensed without examination. Such exemptions were invariably held to be constitutional. Similar exemptions could be established in laws providing for special licensure.

By way of conclusion I wish to remark that, in certain portions of the country, a very dim idea (if any at all) is had by ophthalmologists and otolaryngologists of the detestable state of affairs which, in other portions of the United States, does positively prevail with regard to the practice of the specialties in question. I am not now talking about osteopaths, chiropractors, optometrists, and so on; but of the regular medical profession.

Over and over I have known, especially in the towns and smaller cities, general practitioners who had failed in general practice and who therefore had suddenly bloomed out into eye, ear, nose, and throat specialists.

Once I knew a genito-urinary specialist who overnight became a specialist on the eye.

And general practitioners may refer numerous cases to such "specialists". Is it not time to put an end to these detestable conditions?

Thomas Hall Shastid.

ABSTRACT DEPARTMENT

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history

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10. RETINA AND VITREOUS

Axenfeld, T. **Localization of intraocular tuberculosis and juvenile angiopathy.** Klin. M. f. Augenh., 1930, v. 85, Oct., p. 465. (See Section 17, Systemic diseases and parasites.)

Manes and Moulie. **Retinal detachments.** Arch. de Oft. de Buenos Aires, 1930, v. 5, July-Aug., p. 286.

The authors recently made a tour of the European clinics to observe the various methods of treating retinal detachments.

Sourdille believes the primary lesion is in the pigment epithelium; when a modification occurs in the walls of the choriocapillaris vessels the resulting transudation causes the separation. He uses both injections and cauterizations to establish adhesions between the choroid and retina.

Gonin claims seventy percent of cures among cases of not over two months standing, where the tear is single and no coincident lesion exists.

According to Amsler the retinal separation always means a diseased eye; the retinal tears must be repaired early, otherwise the loss of function becomes permanent. Amsler has observed that when the pupil does not react well to a mydriatic and hypotony is present, the prognosis after ignipuncture is bad. Also the outlook is unfavorable when, after a Gonin cauterization, retinal folds remain and radiate out from the point of application.

The tear may be at a distance from the area of separation, but there is undoubtedly a connection between the two points, as after the tear has been repaired the detached retina subsides. Only those cases should be considered as improved in which this is demonstrable with the ophthalmoscope, the campimeter and by visual acuity.

In locating retinal tears full mydriasis is needed, even if necessary to use subjunctival injections of adrenalin. For the purpose of study the pupil is divided into nine sectors by means of two vertical and two horizontal lines. The fundus reflex is observed for each sector and noted on a diagram which is later used for more accurate localization. Multiple tears are common, although usually one is large and the remainder are small. Cauterization should never be done when the retina is still adherent at the macula, as retractions follow that may eventually destroy central vision.

Lindner is in accord with Gonin in the treatment but believes the depth of the anterior chamber should be taken into account in the localization of the tear. When one is located an intensive search should be made for others, as they are usually multiple. These are apt to be confused with folds of the

choroid, such as are commonly found in myopes, and with retinal hemorrhages.

Treatment consists of (1) akinesia of the orbicularis, (2) cocaine, (3) conjunctival section in the zone of the retinal tear, and (4) the larger tear is first cauterized with a suture in place to be tied immediately after to prevent loss of vitreous. From fifteen to twenty superficial cauterizations are first made to outline the point of separation. The sclera is then penetrated and the cautery is held in position ten to twelve seconds within the retinal lesion. The cautery is then quickly withdrawn and the suture is tied. The same procedure is repeated with the other tears. The cautery must be merely at a red and not at a white heat or bleeding will follow. If these cauterizations fail to produce results Lindner does not hesitate to repeat them. He also believes old detachments should have the chances of operation, as twelve percent are capable of improvement.

The consistency of the vitreous is important, as when it is quite thick and becomes lodged under the retina, coaptation of the edges of the tear is difficult. The separations found in myopes are usually fluid, and hence quite suitable for operation. When tears are fresh and readily accessible the operative improvement should reach seventy percent. *A. G. Wilde.*

Procksch, Marie. **Treatment of retinal and choroidal affections with amyl nitrite according to Imre.** Klin. M. f. Augenh., 1930, v. 85, Dec., p. 795.

Procksch recommends inhalations of amyl nitrite in retinitis pigmentosa, myopia, and other chorioretinal atrophies. For four or five successive days one or two drops of amyl nitrite are inhaled under medical control. As in some cases vision was impaired, the vision must be ascertained before and after inhalation and the drug must not be given to the patient for self-treatment. The patients stated that they saw everything brighter after inhalation. Amyl nitrite seems to improve the light sense, and by influencing adaptation to bring the intraocular tissues under the most favorable functional conditions. *C. Zimmermann.*

Samuels, Bernard. **Cystic degeneration of the retina.** Arch. of Ophth., vol. 4, Oct., 1930, pp. 476-486.

The cystic degeneration of the retina, considered in this paper, is that lying in the posterior portion of the retina. It resembles that in the ora serrata, which has been studied and reported on frequently. It may be classified according to location. The spaces are more pronounced on the temporal side of the optic nerve, though they usually form a circumpapillary system. The largest spaces are invariably found at the fovea, surrounded by smaller ones. They are most frequently located in the internal nuclear layer, then in the external plexiform layer, next in the external nuclear layer, and finally, in the nerve fiber layer.

Considering the cavities with respect to other ocular lesions, we find that detachment of the retina is frequently associated with such degeneration. In glaucoma, they are to be expected at the nerve head and at the macula. They unfailingly appear following obstruction of the central vein, albuminuric retinitis and in Coats' and Hippel's disease. In papilledema, circumpapillary cavities appear, though not constantly. Occasionally, they are found in the macula and not elsewhere in papilledema. They are frequently found in low detachments of the retina, with accompanying choked disk. An interesting finding is their frequent occurrence in lesions of the anterior part of the globe, especially in sympathetic iridocyclitis and syphilitic iritis. In anterior tuberculosis, they are slow to set in. In cases of endophthalmitis, cysts appear in the macular region, accounting for the falling vision. In tumors of the choroid, they are practically always present. They are caused by disturbance of the circulation and the resulting edema. Toxins from in front produce them through infiltration of the walls of the near-by blood vessels. From behind, they arise in cases of tu-

mors of the choroid, due to subretinal toxic fluids and sluggishness of the circulation, even with obstruction of vessels.

Their frequency in the internal nuclear layer is due to the peculiar arrangement of blood vessels on its anterior and posterior surfaces and to the delicateness of the cells of this layer. That the external plexiform layer is next in frequency of involvement is probably due to its juxtaposition with the internal nuclear layer. The frequency of involvement of the macular region is probably a result of its high organization and its sluggish circulation, resulting in poor absorption of edema. The cavities are formed without distention by the simple death of the cells, or by edema, resulting in distention and displacement of the cells, and later pressure atrophy. Occasionally, they may be formed by circulatory disturbances, as in glaucoma. The absence of Mueller's fibers in the macula is responsible for the large, globular formations found in this region. Abscesses of the vitreous, or cutting off of the circulation, result in large, irregular cavities with ill-defined walls. Old cysts may contain a clear fluid, taking little stain; more recent ones are usually filled with a highly albuminous fluid. Occasionally, they are filled with red blood cells. The thickness of the retina is occasionally unchanged by cysts resulting from atrophy; frequently it is greatly thickened. Apparently it is never thinned. *M. H. Post.*

Reese, A. B. **Peripapillary detachment of the retina accompanying papilledema.** Trans. Amer. Ophth. Soc., 1930, v. 28, pp. 341-351.

The author shows with case reports, illustrations, and references that peripapillary detachment of the retina may accompany papilledema from hypotony of the globe, and that peripapillary detachment of the retina may accompany papilledema from increased intracranial pressure. Peripapillary detachment of the retina is no doubt often a factor in causing enlargement of the blind spot from papilledema. *Edward G. Lear.*

Rubbrecht, R. **The obliteration of the retinal tear.** Arch. de. Oft. Hisp.-Amer., 1930, v. 30, July, p. 365.

The author's procedure in the performance of the Gonin operation is described and illustrated in detail, but no statistics of results are furnished. The outstanding details are the use of retrobulbar anesthesia to secure exophthalmos and greater accessibility, temporary resection of the external or internal rectus for the purpose of securing a firmer hold on the globe by the tendon stump, and the use of galvanocautery for a few seconds without advancing deeply into the vitreous.

M. Davidson.

Rubbrecht, R. **Retinal detachment.** Bull. Société Belge d'Opht., 1930, no. 60, p. 44.

The patient, a myope, had had a retinal detachment for two months. The retinal tear measured about one disc diameter. Cauterization was performed following a meridional line 5 to 6 mm. long. The result was good, the retina being fixed so firmly that the detachment was arrested. After five months the result was perfect. *J. B. Thomas.*

Stewans, Hermann. **On the cause and course of retinal inflammation and detachment in renal disease of pregnancy.** Zeit. f. Augenh., 1930, v. 72, Oct., p. 293.

The author describes the clinical course of retinal disturbances in gravid women with kidney disturbances. In a primipara a sudden insufficiency of the kidney arose. In a few days blood pressure was high with albuminuria. The blood nitrogen was not increased. The fundus oculi picture was essentially of choroiditis, followed by bilateral retinal detachment. Only in the stage of regression did a star figure appear in the fovea. There was complete restitution of function. The second patient was pregnant for the seventh time. The manifestations attributable to the kidney disturbance came on gradually, with edema, malaise, and increased blood nitrogen. Post partum the malaise and increased blood nitro-

gen continued. Very gradually a severe retinitis developed which ended in detachment. The retina improved as the blood nitrogen decreased, but an appreciable functional defect remained. In the first patient an apparently mild fundamental disturbance became a chronic nephritis, though the ocular lesion healed, while in the other patient the very severe general disease healed completely, leaving a very defective eye. Vollhard's belief that the retinal changes associated with nephroses are due to vascular pathology and not to the azotemia is not borne out by these two observations. *F. H. Haessler.*

11. OPTIC NERVE AND TOXIC AMBLYOPIAS.

Aebli, Rudolf. **Optic atrophy in Paget's disease.** Arch. of Ophth., 1930, v. 4, Nov., pp. 691-694.

Optic atrophy is relatively rare in Paget's disease. About 400 cases have been recorded in the literature. The case presented not only shows much atrophy, but other unusual ocular symptoms, and bony changes involving principally the sphenoid region, resulting in partial obliteration of the optic foramen and also to some extent of the sphenoidal fissure. There was complete right optic atrophy, with a small island of perception of hand movements in the upper part of the field, and partial left optic atrophy, with vision of 20/200. The whole sphenoidal bone showed in x-ray plates as sclerosed and thickened.

M. H. Post.

Barletta, V. **Hematoma of the optic nerve sheaths after traumatic hemorrhage into the ventricles.** Ann. di Ottal., 1930, v. 58, Nov., p. 648.

A girl of sixteen years, while at a dance, was accidentally thrown against a companion whose elbow struck her over the right temporal region. She immediately suffered acute pain which shortly remitted sufficiently to allow her to continue her dancing. Half an hour later she fainted and did not recover consciousness. She was taken to a hospital where after nine hours the right eye was found proptosed and immobile. The left eye on the contrary was in rapid involuntary motion. All of the body muscles were twitching. The breathing was stertorous. The ophthalmoscope disclosed an edematous papilla with an elevation of three diopters, cloudy margins, turgid veins, and narrowed arteries. Death ensued after a few hours. At autopsy an extensive hematoma of the cerebral ventricles was found, extending to the infundibulum and past the chiasmal region into the sheaths of both optic nerves. Histological examination showed edema of the sheaths of both optic nerves and dilatation of the lymphatic spaces, the central vessels being empty of blood throughout their entire course. There was no fracture of the skull. The unusual character of the case lies in the serious result following a seemingly light injury and the opportunity for studying a case of choked disc microscopically so soon after the injury. (Bibliography and plates.)

Park Lewis.

Charlin, C. **Etiology of choked disc.** Arch. de Oft. Hisp.-Amer., 1930, v. 30, July, p. 353.

(The author of this paper seems to have indulged in the undesirable practice of publishing the same paper in three different eye journals, the other two being Klin. M. f. Augenh., 1930, v. 85, Dec., p. 764; Arch. de Oft. de Buenos Aires, 1930, v. 5, April, p. 124.)

The conclusions drawn from an analysis of fifty-two cases of choked disc, of which nineteen were due to neoplasm, nineteen to lues including gummata, seven to uremia, two to tuberculous meningitis, and five to miscellaneous etiology, are as follows. Those due to neoplasm were accompanied by focal symptoms, integrity of the cardiovascular apparatus, and obvious severe involvement of the nervous system in the form of great mental and physical debility, in sixteen out of the nineteen cases. They were further characterized by abundance of albumin and only a

mild leucocytosis in the spinal fluid, and negative spinal Wassermann. Those of luetic etiology, whether in the presence of gummata and offering the picture of the neoplastic type or not, were characterized by a high leucocytosis and positive Wassermann of the spinal fluid and response to antiluetic treatment in two or three weeks. The results of neglect of diagnosis and treatment in these luetic cases are summed up in the aphorism: "A luetic tumor untreated kills and a luetic meningitis undiagnosed blinds." The cases due to uremia were characterized by absence of focal symptoms and definite involvement of the cardiovascular apparatus in the form of arterial hypertension and renal insufficiency. In these cases the choked disc is in reality a feature of albuminuric retinitis, and a case is cited in which a typical albuminuric retinitis was observed a few days after the onset of the choked discs. The pyrexia and occasional finding of bacilli in the spinal fluid lead one to the diagnosis of tuberculous meningitis. Of the five cases of miscellaneous etiology one accompanied an infectious meningitis after tonsillitis, one was due to a sphenoiditis, one to eclampsia, and in two the etiology was obscure. Thus fifty percent of the cases were due to neoplasms, including the gummata and tuberculomata. No etiological diagnosis can, of course, be made from the ophthalmoscopic picture alone.

M. Davidson.

Colrat, A. **Stellate pseudoretinitis and edema of the papilla in intracranial hypertension due to tumor.** Arch. d'Opht., 1930, v. 47, Nov., p. 773.

Two cases of undoubted intracranial tumor (one a glioma confirmed at autopsy) are reported in which retinitis characterized by papilledema and a star figure at the macula was present. In both these cases the fundus picture was essentially that of albuminuric retinitis, although the kidneys showed no evidence of functional damage and in the one case no kidney lesions were found at autopsy. Therefore it must be considered that intracranial tumor may simulate the picture of albuminuric retinitis. *M. F. Weymann.*

Eppenstein, Arthur. **Choked disc from hypotension.** Klin. M. f. Augenh., 1930, v. 85, Nov., p. 672.

A man aged seventy-nine years suffered for two days excruciating pain from acute glaucoma of the left eye, which had a tension of 28 mm. (the right was 12 mm.). Vibration massage under holocaine anesthesia relieved the condition, with a decline of tension to 5 mm. After seven days the optic disc protruded 1.5 D., it was edematous, and the vessels were more filled. Normal pressure of liquor in the sheaths of the optic nerve had thus in consequence of diminished intraocular counterpressure forced the disc into the interior of the globe just as would increased pressure of the liquor from other cause.

C. Zimmermann.

Grinker, R. R. **Tumors of the optic nerve.** Arch. of Ophth., 1930, v. 4, Oct., pp. 497-508.

A girl aged thirteen years had been injured in an automobile accident two years before admission to the hospital. The vision had gradually failed. All other cranial nerves were normal in function. There was homonymous hemianopsia through the fixation point, disturbance of pupillary reaction, partial optic atrophy, and partial papilledema in each disc, fixing the location of the tumor about the chiasm. X-rays showed dilated optic foramen on the left side, diastasis of the cranial sutures, and increase in the size of the sella turcica with suprasellar rarification, suggesting the possibility of a tumor of Rathke's pouch. On exploratory operation, a tumor was found within the chiasm, so no attempt was made to disturb it, as death, with hyperpyrexia, has frequently resulted from manipulation of chiasmal gliomas. Instead, deep roentgen therapy was instituted, with the result that life had been prolonged up to the time of writing, a period of eighteen months. *M. H. Post.*

Ohm, J. **Optokinetic nystagmus in retrobulbar neuritis.** Graefe's Arch., 1930, v. 124, p. 128.

The course of a severe retrobulbar neuritis attacking one eye after the other and showing no objective signs could be depicted in the form of curves by the aid of a rotatory test object and a nystagmograph. The author thinks there are no other objective methods of examination which can compare with that shown by these curves.

H. D. Lamb.

Pflimlin, R. **Treatment of alcohol-tobacco amblyopia with nitroscleran.** Klin. M. f. Augenh., 1930, v. 85, Dec., p. 787.

Pflimlin reports good results, as shown on sixteen case records arranged in tabular form, from intramuscular injections of nitroscleran in alcohol-tobacco amblyopia. Nitroscleran, manufactured by Tosse in Hamburg, consists of from 2 to 4 percent sodium nitrite in physiological salt solution with admixture of small quantities of phosphates, and has a vasodilator action. Every second or third day, 0.02 gm. was injected, and after from four to five days 0.04 gm. In some cases good results were observed after nine or ten injections, in others after twenty or more. In a number of patients the treatment had to be prematurely stopped on account of feelings of congestion, discomfort, or vertigo. All cases presented a typical picture, partly described by Vogt, in red-free light: mottled macular zone, loss of the yellow color, distortion or total absence of the foveolar reflex, poor or absent delineation of the nerve fibers. These did not subside after the injections, even after return of normal vision, except in one case. In ordinary light the pallor of the whole, or of the temporal portion, of the optic disc was in some cases replaced by partial return of the red hue. This can only be explained by removal of the vascular spasm. The patients' ages ranged between fifty and sixty years, and all had marked arteriosclerosis and high blood pressure. On account of its vasodilator action a certain caution in application of the drug is required. In cerebral arteriosclerosis it is contraindicated on account of the danger of apoplexy.

C. Zimmermann.

Rollet, J. Paufique and Levy, A. **Fractures of the optic canal.** Arch. d'Opht., 1930, v. 47, Nov., p. 737.

After discussion of various methods of examining the optic canal a brief review of its anatomy is given. The work of Hartmann in the field of radiography of the optic canals is dwelt upon in detail. The technique for obtaining roentgenograms for the study of the optic canals is explained and diagrams to aid in the interpretation of such roentgenograms accompany the article. Observations with a study of the x-ray findings upon ten patients are reported. In only one case of the ten was a fragment displaced into the canal. Clinically it was concluded that unilateral immediate total loss of vision with loss of the pupillary reflex in the blind eye, followed by primary atrophy of the nerve within three weeks after a blow on the head, would indicate a fracture of the optic canal. The prognosis is bad, as complete blindness occurred in eight of the ten cases studied, while the other two had permanent central scotomata. In studying the roentgenograms comparison of the affected with the unaffected side is of the greatest value in discovering the fractures. The writers are of the opinion that the nerve atrophy is due to direct contusion at the time of the injury and not to subsequent hematoma or displaced fragments. Therefore the outlook for favorable results from surgical intervention is not good.

M. F. Weymann.

Scheerer, Richard. **The topography of the optic nerve margin in the myopic and in the nonmyopic eye.** Graefe's Arch., 1930, v. 124, p. 53.

In this study the author observed the findings in eight eyes of individuals varying in age from a still-born infant to a nine-year-old child; five eyes with inverse papillæ in patients at various

ages; and also fourteen eyes of adults of widely varying ages of life and conditions of refraction for comparison among themselves and with the first-mentioned eyes. The changes about the optic nerve entrance that were particularly studied were those emphasized by Levinsohn. On the temporal side were: (1) Attrition of the scleral margin. (2) Lateral bowing of the optic nerve fibers to lie behind the lamina vitrea. (3) Retraction of the lamina vitrea and of the pigment epithelium. (4) Atrophy of the choroid. (5) Advanced position of the lamina cribrosa. On the nasal side occurred: (6) Supertraction of the lamina vitrea and the pigment epithelium over the optic nerve. On one or both sides were found: (7) Angular cracking of the lamina vitrea. (8) Angular cracking of the neuroepithelium.

It was found that the bowing of the optic nerve fibers lateralward so that they come to lie behind the end of the lamina vitrea, or a relative retraction occurred in all conditions of refraction (from minus 6 to plus 9 D.) and at all ages (from still-born to old age). It lies usually on the temporal side (in twenty-two eyes studied), but is found occasionally and with inverse papilla upon the nasal side (five eyes). In vertical sections through the optic nerve it can be demonstrated above and below (in one eye). The formation of the scleral spur and the supertraction are independent of refractive condition and age and occur also in the inverse arrangement on the temporal side.

H. D. Lamb.

Szekely, Josef. **Rudimentary coloboma of the optic nerve downward, and temporal coloboma.** Klin. M. f. Augenh., 1930, v. 85, Dec., p. 799.

A rudimentary coloboma of the optic nerve in a man aged fifty-eight years is described. A second patient aged thirty-six years presented a temporal coloboma of the optic nerve. The theories of Hippel, Elschnig, and Szily, the last of whom attributes its origin to an abnormal proliferation of the ectoderm at an embryonic stage before development of the fissure of the ocular cup, are discussed. *C. Zimmermann.*

Wilmer, W. H. **Chronic retrobulbar neuritis.** Arch. of Ophth., 1930, v. 4, Dec., pp. 817-837.

The present paper is confined to a consideration of those cases in which occurs involvement of the papillomacular fibers. A number of cases are reported, after which the various factors producing them are discussed. The general clinical picture and its etiology are considered. The first observed phenomenon is a cloud or blur in or near the center of vision, later becoming a definite blind spot. The scotoma varies, dependent upon the causative agent. First red and green are affected, later blue and white. It must be differentiated from toxic amblyopia. The fundus at first appears normal. There is possibly slight blurring of the disc margins, with hyperemia and fullness of the veins. Later, pallor of the nerve sets in, beginning in the temporal portion, with increase in the physiological cup. Pathological examination shows atrophy of the axis cylinders, with inflammatory changes in the supportive connective tissue and proliferation of the glial cells. Opinion is divided as to the primary seat in the axis cylinders and ganglion cells of the retina, or in inflammatory changes. In Leber's disease, a true abiotrophy may take place.

The underlying conditions causing these disturbances are discussed in detail by the author. In conclusion, he suggests a detailed family history and complete physical survey, including the spinal fluid in all doubtful cases.

M. H. Post.

12. VISUAL TRACTS AND CENTERS.

Aureliano, F. **Roentgentherapy in tumors of the hypophysis and the chiasmatic syndrome: technic and results.** Ann. di Ottal., 1930, v. 58, Aug.-Sept., p. 756.

In pituitary enlargement the sella is characterized either by decalcification or by hyperostosis of the clinoid processes and is indicative of inflammatory phenomena. In caseous tumors or

meningiomata this may have pathognomonic significance. Often the displacement or erosion of the bony plates is due to the pressure exerted by the neoplastic mass.

Acromegaly presents a characteristic picture. Generally the growth is benign, as in adenoma, and develops preferably from the anterior lobe. The floor of the sella and the quadrilateral lamina are thinned, or decalcified, and usually elongated because of erosion of the floor. The author studied the effects of pressure on the chiasm and the visual fields resulting from it. He advocates irradiation in preference to surgical intervention, when possible, because of the great mortality following the latter. (Bibliography.) *Park Lewis.*

Brown, E. V. L., and Kronfeld, P. C. **The acuity of binocular depth perception in hemianopia.** Arch. of Ophth., 1930, v. 4, Nov., pp. 626-639.

Six cases of homonymous hemianopia were studied. In four, the lesion was above the geniculate body; in two, in or below the geniculate body. It has been found that the normal oscillation of the eye in fixation varies from 10 to 40 arc minutes; therefore, preservation or sparing of the point of fixation, amounting to not more than 15 minutes, was not considered to be due to the presence of visual field on the side of the hemianopia, but rather to the unsteadiness of the eye. The six cases observed were all similar, so that one only is reported. In this case there was right-sided homonymous symmetrical and congruous hemianopia, with 14 arc minutes of sparing of the macula. The average binocular parallactic angle was less than 5.5 seconds. Eight seconds has been considered normal, and satisfactory for aviators, according to the reports of Harvey J. Howard in his governmental work in the examination of aviators.

Most of the incorrect answers were given when the right rod was nearer to the patient. Under certain circumstances, all answers were wrong when the right rod was nearer. This is explained in the following manner: The normal person probably fixes one rod and then the other and compares the two impressions. The sensation of depth is then obtained by comparing the relation between the actual position of the two rods and the horopter, wherein should lie all points subjectively equidistant. If three rods were used and placed so as to appear equidistant, we should find that the middle rod would be slightly nearer to the eyes of the observer than the lateral ones. In cases of hemianopia, one-half of the horopter is missing and the curvature of the horopter becomes apparent. In right-sided hemianopia, where the left half of the horopter alone remains the left rod must be put slightly further away in order to appear equidistant with the right. The preponderance of the influence of the homolateral eye acts in a similar way to the curvature of the horopter; that is, in a case of left sided hemianopia in which the left rod is fixed and the right one is seen eccentrically, the influence of the right eye is stronger and the right rod is projected further away.

Finally, tests were made with the rods placed one above the other, instead of side by side, as in previous experiments. The answers were about as accurate as those of normal persons. The rods were as thin as possible, subtending an angle of one arc-minute, placed sufficiently apart so that the disparity amounted to two arc minutes; and one-half second was the time of exposure.

The values obtained were within the limits allowed for normal persons. If, of the two disparate images, one lay on the blind part, the other on the seeing part of the retina, the patient failed, in harmony with Heine's theory that in hemianopia without sparing of the macula the ability of perceiving depth in the center of the field is lost.

M. H. Post.

Fuchs, A. **Ophthalmic migraine with isolated trochlear paralysis and other cases of migraine.** Wiener klin. Woch., 1930, v. 43, May, p. 618.

The author reviews the literature of ophthalmic migraine and reports one

case in a man, twenty-four years of age, who had had regular attacks twice a year for twelve years; with the last attack, after the severe headache which lasted for three days, the patient showed a paresis of the superior oblique only. The general and all special examinations were negative.

The author found one case reported by Luzenberger, in 1897, in which the trochlear was involved but cleared up in eight days; Bornstein, in 1909, reported a case in which the internal rectus was involved but cleared up in a few months. The author reported three other cases of migraine which showed temporary hemianopic field defects and which he feels may have been due to a spasm or a change in the vessels in the area of the brain involved according to the field effect. Also he points out that atypical migraine attacks may cause headache and a hemianopsia for red, and be due to mild apoplectic attacks. *Beulah Cushman.*

Hirsch, Oscar. **Tumors of the hypophysis and their treatment.** Klin. M. f. Augenh., 1930, v. 85, Nov., p. 609.

Hirsch considers the tumors of the hypophysis from the anatomopathological and surgical standpoints. The anterior lobe of the hypophysis regularly consists of three kinds of cells. eosinophiles, basophiles, and main cells. The eosinophiles form the greatest mass and are considered as the bearers of secretion. The most frequent tumors are the eosinophile adenomas, with few exceptions the cause of acromegaly. Chondromas are rare. Surgically the tumors are classed as suprasellar, intrasellar, intracranial solid tumors growing toward the sphenoidal sinus and toward the cranial cavity into the brain, and cysts. The diagnosis depends upon the habitus, ocular findings, and roentgen picture. The clinical aspects produced by tumors of the hypophysis are: acromegaly (benign without, malignant with, progressing visual disturbances), adiposogenital degeneration (ocular type), and hypophysial cachexia and nanism.

Hirsch found visual disorders in all his cases, except those of benign acromegaly. Direct vision generally fluctuated between normal in one eye with impairment in the other and impairment of one and amaurosis of the other. Temporal or bitemporal hemianopsia occurred in 84 percent, homonymous in 7 percent, nasal defect in one eye in 4.4 percent, central scotoma in 11 percent, no characteristic disturbances in 7 percent, primary optic atrophy in 89 percent, optic neuritis in 4.4 percent, choked disc in 8.9 percent. Papillitis and neuritis were so rare that if they are present one must hesitate with the diagnosis of hypophysial tumor. The roentgen picture of enlarged sella and choked disc alone does not absolutely speak for hypophysial tumor, nor does a normal sella speak against it. Medication with hypophysis preparations, iodine, etc., has no influence on decompression of the optic nerve. Roentgen rays are sometimes beneficial. In rapid failure of the optic nerve only operative therapy is to be considered. The different methods of operation proposed by Krause, Schlosser, and Cushing, with their results, are described, followed by a synopsis of 161 cases from 1910 to 1929 operated on by Hirsch, at first by his ethmoidal and then his septal method, of which 82 are living. Excellent results may be attained in the majority of cases if the patients come in time.

C. Zimmermann.

Jusefova, F. I., Czerny, L. I., and Geinisman, J. I. **Clinical course and roentgen therapy of hypophyseal tumors.** Russkii Opht. Jour., 1930, Oct., pp. 289-314.

Seventy cases of hypophyseal tumor were studied by the authors from the ophthalmologic, neurologic, and roentgenologic viewpoint.

Color-field changes and various types of scotoma constitute the earliest evidence of hypophyseal tumors. In advanced cases bitemporal hemianopsia is a prevalent finding. Not infrequently one eye is totally blind while the other has a temporal defect in the visual field. Concentric limitation is rare, and homonymous hemianopsia is excep-

tional. The common ophthalmoscopic change is that of a descending optic nerve atrophy. A choked disc is sometimes seen superimposed upon the atrophy as the result of an increase in the intracranial pressure. The loss of central vision is unequal in both eyes, and is often strikingly disproportionate to the pallor of the optic disc. All cases observed by the authors were subjected to deep x-ray therapy. Several series of applications were given in every case, each series consisting of eight applications. Not more than one skin erythema dose was given in each application. The results of roentgen therapy were most gratifying in cases of acromegaly, and satisfactory in cases of adiposogenital dystrophy. In the ophthalmic group of hypophyseal tumors roentgen therapy was least effective. A decompression preceding the x-ray therapy is recommended by the authors only in cases of increased intracranial pressure. *M. Beigelman.*

Riley, H. A. **The central nervous system control of the ocular movements and the disturbances of this mechanism.** Arch. of Ophth., 1930, v. 4, Nov., pp. 640-661; and Dec., pp. 885-910.

The author discusses the connection of the Edinger-Westphal nucleus with the oculomotor nucleus and points out the possibility of its relation to the intraocular muscles of the eye. The nucleus of Perlia, formed by fusion of the median portions of the chief or third nucleus, which is a bilateral columnar series of cell groups extending from the caudal limit of the third ventricle to about the middle of the inferior colliculus, is the last portion to differentiate and appears first in the primate series with the inception of the function of convergence. The opinions of various investigators with regard to the localization of function in this nucleus are reviewed.

The author finds that the identity of the brain-stem centers for control of ocular movements is largely conjectural. The evidence for a center of divergence is most indefinite. Connection between the eighth cerebral nerve and the oculomotor mechanism is well established. The connection between the acoustic division and the oculomotor mechanism results in reflex lateral movements of the eyeball and is represented by the peduncle of the superior olivary nucleus passing dorsally and mesially toward the vicinity of the abducens nucleus, probably terminating in the adjacent center for lateral movements. Investigations seem to indicate that the slow deviation in nystagmus is the result of some irritative lesion while the rapid recovery is due to assertion of the function of the center for control of these movements.

In the second portion of the paper the author discusses the disturbances caused by lesions of the root fibers within the brain stem, including congenital aplasia of the oculomotor nuclei, chronic progressive external ophthalmoplegia, intoxication, the infections of the nervous system, neoplasms, vascular accidents, and injuries; ocular syndromes, including superior alternating hemiplegia, the tegmental syndrome of the midbrain, the syndrome of median alternating hemiplegia, and the syndrome of Foville and hyperkinetic disturbances. The paper closes with reports of cases observed by different writers, of volitional control of the ocular movements, disturbances of vertical control, and functional disturbances of the entire oculomotor apparatus. *M. H. Post.*

Trettenero, A. **Etiology and pathogenesis of binasal hemianopsia. Case resulting from sunstroke on a tertiary luetic basis.** Ann. di Ottal., 1930, v. 58, Oct., p. 886.

Homonymous hemianopsia has been recognized by ophthalmologists for a century. The bitemporal form was first described only about sixty years ago; the binasal is so rare that in all literature only eighty-nine cases have been reported. Of these the vast majority, over two-thirds were in males of advanced life, and in thirty-two percent of the cases the condition was due to some cerebral neoplasm. In the case reported the patient, a woman of sixty

years who had worked in the hot sun, was suddenly taken with intense frontal headache with clouding of the sight and nuchal rigidity. On the twenty-second day in the hospital lumbar puncture showed increased pressure with hemorrhage. Vision was reduced O. D. to 1/10, O. S. to 1/20. Ophthalmoscopic examination gave evidence of optic neuritis—with enlargement of the disc, intense vascular congestion, and binasal hemianopsia limited to the median line. A later test showed diminishing fields in the remaining area. An autopsy was not secured. The author concludes that in a soil predisposed by tertiary syphilis the heat of the sun brought on a hydrocephalus causing sudden intracranial pressure as shown by the force with which the spinal fluid was expelled. This was accompanied by optic neuritis with stasis of the papillary vessels. The ventricles refilled with liquid pressing especially on the chiasm and producing the unusual phenomenon of binasal hemianopsia. *Park Lewis.*

13. EYEBALL AND ORBIT.

Birch-Hirschfield. **On the genesis of traumatic enophthalmos.** Zeit. f. Augenh., 1930, v. 72, Oct., p. 259.

Traumatic enophthalmos is rare. The author could collect only 164 reports. It must often be overlooked. It probably does not have the same pathogenesis in all cases. A loss of orbital fat, an increase of the size of the orbit as a result of a depressed fracture, a shrinkage of orbital posttraumatic scar tissue, or a displacement of retrobulbar orbital tissue to the anterior part of the orbit may each be a cause. That one of these conditions may exist without resulting in enophthalmos is shown by a case recently observed by the author in which no change in position or motility of the eyeball followed surgical removal of the entire lower and medial orbital wall. *F. H. Haessler.*

Contreras Jimenez. **A case of teratogenic abnormality.** Arch. de Oft. Hisp.-Amer., 1930, v. 30, March, p. 144.

A case is described and illustrated exhibiting on the right an anophthalmos with an encephalocele instead of the globe, and on the left a cryptophthalmos in which the globe moved with the movement of the overlying skin. There was no consanguinity, but an older brother three years old was only just beginning to walk. *M. Davidson.*

Walkow, Felix. **A case of periodic exophthalmos.** Klin. M. f. Augenh., 1930, v. 85, Nov., p. 669.

An always healthy man of forty-three years was suddenly affected with exophthalmos of the left eye on October 17, 1922, without apparent cause. Vision R. or L. 5/5, no ophthalmoscopic changes. After two days' rest in bed the exophthalmos disappeared. On April 4, 1925, it reappared in a coughing spell during influenza. The patient complained of severe pain and the disc was indistinct. After a few days' rest in bed and a compression bandage the exophthalmos subsided. It returned, also transiently, on January 11, 1927, but the vision of the left eye was abolished from atrophy of the optic nerve. May 20, 1930, on stooping, another painful return of the exophthalmos occurred. After discussing and excluding all other etiological factors the author assumed exophthalmos from varicosities of the orbit. *C. Zimmermann.*

Wright, R. E. **Two cases of granuloma invading the orbit due to aspergillus.** Brit. Jour. Ophth.. 1930, v. 14, Nov., p. 601.

This is the completed bacteriological investigation, by H. W. Acton, on the two cases reported by the author in the November, 1927, issue of the same journal. In case one, the original tube and a subculture both contained the aspergillus oryzæ, characterized by the conidial heads being green. In case two, the aspergillus was a species of a type of flavus. After x-ray treatment case one improved very much, but the patient refused to stay, and three years later the granulomatous mass was even larger than originally. The growth was uninfluenced by radium. Further x-ray treatment was refused.

D. F. Harbridge.

14. EYELIDS AND LACRIMAL APPARATUS

Eisner, Filip. **Anomalous growth of a lash.** Klin. M. f. Augenh., 1930, v. 85, Dec., p. 810.

A man aged fifty years came three times within two years with erosion of the lower nasal quadrant of the right cornea, caused by the exposed root of a lash. Probably the follicle of the lash developed far back in the lid near the conjunctiva and had broken through. Its removal cured the corneal erosion.

C. Zimmermann.

Friede, R. **Peripheral neurectomy in blepharospasm.** Zeit. f. Augenh., 1930, v. 72, Oct., p. 299.

The author describes his experience with two patients completely cured of severe blepharospasm by peripheral neurectomy of the facial nerve. He makes a skin incision two centimeters from the temporal orbital margin, and parallel with it. After freeing the skin from the underlying tissue he makes two parallel incisions one centimeter apart, down to the periosteum. With scissors he excises the deep tissue between these incisions.

F. H. Haessler.

Goldfeder, A. E. **A new tarsoplastic operation for cicatricial eversion of lids.** Ukrainskii Oft. Jour., 1929, v. 1, pp. 146-150.

This new tarsoplastic operation, consisting of a cartilaginous implant from the ear into the lid cartilage, is said to have the following advantages: (1) Its technique is extremely simple. (2) It is performed without sutures. (3) It requires very little time. (4) It causes no cosmetic defect nor disfigurement. (5) The solid cartilaginous support insures a good and correct position of the lid. (6) It also insures, as far as can be hoped, more than any other operation, against entropion or relapses; and, in the event of such complications, the operation can easily be repeated.

J. I. Gouterman.

Haitz, Ernst. **Treatment of stenosis of the lacrimal punctum.** Klin. M. f. Augenh., 1930, v. 85, Oct., p. 541.

The canaliculus is slit to an extent of 2 mm. and the tongue of the punch devised by Haitz (illustrated here) is introduced for 1.5 to 2 mm. When the instrument is closed a piece of the posterior layer of the eyelid 1.5 mm. long and 1 mm. wide is punched out. The opening is not much larger than the tear point, but is displaced a little backward, so that its immersion into the lacrimal lake is improved.

C. Zimmermann.

Löwenstein, Arnold. **Iodipin treatment of blennorrhea of the lacrimal sac.** Klin. M. f. Augenh., 1930, v. 85, Dec., p. 811.

Löwenstein reports good results from injections of 10 percent fluid iodipin in blennorrhea of the lacrimal sac, illustrated on five cases, in which the suppuration and also the epiphora subsided after a few injections.

C. Zimmermann.

Marquez, G. **A contribution to the study of congenital entropion.** Arch. de Oft. Hisp.-Amer., 1930, v. 30, April, p. 187.

Two cases of congenital entropion are described and the successful results from operation are illustrated. The author classifies congenital entropion into: (1) essential, due to aplasia of the tarsus and overaction with subsequent spastic contracture of the orbicularis, analogous to senile entropion from atrophy of the tarsus; and (2) symptomatic (in which the tarsus is normal), due to lack of palpebral conjunctiva and cul-de-sac, analogous to cicatricial entropion. The first type requires reenforcement of the tarsus by the formation of scar tissue and paralyzing the orbicularis by injections or other means. The second type demands a plastic operation. In one of his cases belonging to this type the author found the creation of a new lower cul-de-sac by liberating the lid and transplanting buccal mucosa gave a much better re-

sult than raising the lid by a sliding flap operation as practiced and advocated by Aubineau in a similar case.

M. Davidson.

Meerhoff, Walter. **Treatment of xanthelasma with thorium x (Degea).** Klin. M. f. Augenh., 1930, v. 85, Nov., p. 661.

Six cases are reported. Each xanthelasmic area was covered with a single sheet of gauze of the same size soaked with a drop of thorium solution, and after evaporation of the drop it was renewed four or five times. This treatment was continued until hyperemia set in, shown by more or less redness, which in some cases increased to livid red and was sometimes followed by desquamation of the epithelium. These phenomena soon subsided without leaving changes of the skin. In two patients a slight depigmentation remained. The cosmetic results were very satisfactory, but the treatment did not prevent relapse. If this occurred it was speedily removed by renewed application of thorium, no increased resistance appearing after the first application. *C. Zimmermann.*

Owen, H. B., and Hennessey, R. S. F. **A case of Mikulicz' disease.** Brit. Jour. Ophth., 1930, v. 14, Nov., p. 582.

An African, aged between fifty and sixty years, presented a most unusual appearance. There were enormous swellings in both orbits, and bulging of the lids, greater above than below. The lacrimal glands presented large firm movable masses, larger on the left side than the right. Ocular movements were limited. The parotids were not enlarged, but the sublingual, submaxillary, cervical, and axillary glands were markedly affected. There were small firm nodules in the lips, cheeks, and hard palate. The lacrimal glands of the upper lids were easily shelled out, but the lower orbital masses were adherent. Fourteen weeks after excision there was no evidence of recurrence. Microscopically, no traces of the original glands could be discovered. The average lymphocyte and leucocyte counts being 12,280 and 17,616 respectively, with a slight anemia of 3,287,000, it is difficult to classify the case. Is the blood picture sufficient characteristic to justify a diagnosis of leukemia, or was it Mikulicz' disease proper or Mikulicz' disease plus involvement of the lymphatic glands? The contributor is undecided. (Two excellent illustrations.) *D. F. Harbridge.*

15. TUMORS

Cary, E. H. **Tumors of the eye and adnexa.** Jour. Amer. Med. Assoc., 1930, v. 95, Dec. 13, p. 1806.

In reporting twenty-two cases of ocular tumor, the author follows Collins' and Mayou's classification of neoplasms. As so many cases of retinoblastoma come to the ophthalmologist very late, a plea is made for closer observation and more prompt interpretation of the meaning of the "amaurotic cat's eye" by the general practitioner. Attention is called to a simple and quicker way of preparing the enucleated eye for macroscopic cross-sectioning by the injection of formaldehyde via the optic nerve. The procedure of tying and incising all the branches of the external carotid on each side seemed definitely to have delayed the death of several of the patients in whom it was used. It is especially valuable in sarcoma of the antrum, where the starvation method can be made more complete. (Discussion.)

George H. Stine.

De Vries. **Cavernous angioma of the orbit of sixty-four years' duration, with phleboliths proved roentgenologically.** Klin. M. f. Augenh., 1930, v. 85, Oct., p. 538.

A man aged sixty-four years, with left exophthalmos which caused excruciating pain, came in a very poor condition. The apparently congenital tumor was observed by the father when the patient was a small boy, and twenty years ago an operation had been refused. The eye, which saw only hand motion, was displaced 3 cm. forward and 1 cm. downward, was immovably

fixed and surrounded by swollen conjunctiva, and presented keratitis e lagophthalmo and iritis. A large, tensely elastic tumor protruded between upper lid and eyeball from the depth of the orbit, in which hard nodules could be felt. The globe was easily enucleated, the smooth thin capsule of the tumor was exposed, was separated from the orbital walls with blunt instruments, and its apex cut with scissors, with very slight hemorrhage. A gauze tampon was placed between two conjunctival sutures. The patient left with a prothesis after a few weeks. The microscopic examination confirmed the diagnosis of angioma. The phleboliths showed concentric structure and calcification. *C. Zimmermann.*

Hippel, E. **The prognosis in uveal sarcoma.** Graefe's Arch., 1930, v. 124, p. 206.

The author reports the number of cases showing metastases after sarcoma in the uveal tract among 84 cases observed by himself and among 609 cases collected from the literature. Among the author's 84 cases, 41 eyes were enucleated in the first stage of growth of the neoplasm, 34 in the second stage, and 8 in the third stage. Metastases occurred in 33 cases or in 14 eyes (34 percent) removed in the first stage, 16 (47 percent) in the second stage, and 3 (38 percent) in the third stage. A similar estimation for the 609 cases of uveal sarcoma from the literature gave 162 cases with metastases, of which 36 cases occurred among 131 cases (27 percent) enucleated during the first stage of uveal sarcoma, 73 among 285 cases (25.5 percent) enucleated during the second stage, and 53 among 193 cases enucleated in the third stage. These significant figures in both series clearly indicate the early tendency to metastasis of uveal sarcoma and the not entirely unfavorable prognosis of cases attaining the third stage. In all cases in which there is a second useful eye, the author advises enucleation as soon as the diagnosis of sarcoma is certain; but when the eye in question is the only useful eye he would wait as long as the vision has any useful value. For the present the author, as do Seefelder, Fleischer, and Wessely, thoroughly disapproves of exenteration of the orbit in uveal sarcoma. In conclusion mention is made of the slow growth, the lack of definite knowledge on metastasis, and the possibility of removing iris sarcoma by iridectomy.

H. D. Lamb.

Janson, E. **Roentgen treatment of glioma of the retina.** Klin. M. f. Augenh., 1930, v. 85, Oct., p. 542.

In November, 1927, a girl, born October 18, 1926, showed blindness of the left eye from glioma of the retina filling the whole vitreous. At enucleation, ophthalmoscopy during narcosis disclosed nothing abnormal in the right eye. In March, 1928, the parents noticed for a few weeks a shining from the left eye and brought the child again, when a flat oval greyish-white area of three disc diameters at the macular region was observed. The left orbit showed nothing suspicious. The eye was treated with roentgen rays up to January 18, 1929. August 9, 1929, the tumor had grown toward the optic nerve, and the last report from the parents on July 1, 1930, was that the eye protruded very much and discharged a bloody fluid and the child had become very decrepit. Hence the radiation had failed.

C. Zimmermann.

Knapp, Arnold. **Small tumor of the iris which caused secondary glaucoma: relation of melanoma to sarcoma of the iris.** Arch. of Ophth., 1930, v. 4, Nov., 1930, pp. 720-726.

The patient was thirty years old. The iris was blue, except between three and five o'clock, where it was brown. This sector, though perfectly flat, was slightly thickened at the periphery. The spot had been noticed for about nine years. Tension of 42 mm. was relieved by trephining. Four months later, tension was normal, but the brownish mass had increased in size. Enucleation was advised. A tumor of the iris was found, in which three layers could be recog-

nized: (1) Compact spindle cells of varying pigment content, continuous with a similar process in the angle and along the scleral spur; (2) A second layer was more loosely pigmented. The nuclei were round, with a direction downward into the iris stroma. (3) The third layer occupied the stroma, and was packed with less pigmented cells, possessing large nuclei. These cells resembled the chromatophores of the iris. A few of the vessels also contained pigment cells.

When there are a number of pigmented spots in the iris, only one becomes transformed into a malignant growth. In the case reported it is remarkable that the pigmented spot was not prominent enough to warrant the diagnosis of tumor, though it did produce glaucoma. *M. H. Post.*

Lazarescu, D., Lazarescu, E., and Ionescu, E. **A case of epithelioma of the meibomian glands.** Brit. Jour. Ophth., 1930, v. 14, Nov., p. 588.

During the years 1919 to 1929 there were fifty-three cases of cancer in the region of the eye in the clinic of Jassy. Of this number twenty-five were localized on the lids; only one was found developed in the meibomian glands. The number of reported cases in the literature to date is forty-eight. Cancer in the meibomian glands is more frequent than in the glands of Zeiss. It is more frequent in the upper lid, affects both sexes, and usually occurs in middle life. It is insidious in onset and is frequently mistaken for chalazion. Owing to this neoplasm's great tendency to metastasis by the lymphatic paths, it is more serious than cancer of the skin. Prognosis is complicated by the fact that by the time a true diagnosis has been made metastasis has already occurred. Early, the tumor is circumscribed. Round or elliptical cells with large nuclei and scanty protoplasm, and others with small nuclei and abundant protoplasm, are distinguished.

Early wide excision is indicated, in advanced cases exenteration. A male aged sixty-seven years presented a small lump on the outer half of the ciliary border of the upper lid. The contents were curetted on the supposition that the condition was chalazion, but as the condition recurred V-shaped excision of the growth was done. Sections showed epithelioma of the meibomian glands. (Two illustrations and four microphotographs.)

D. F. Harbridge.

Morton, H. McI. **An atypically situated sarcoma of the conjunctiva.** Jour. Amer. Med. Assoc., 1930, v. 95, Dec. 13, p. 1804.

Melanotic sarcoma of the conjunctiva is relatively rare. In the case reported, the growth was exceptionally situated on the outer part of the bulbar conjunctiva five or six millimeters from the limbus. It was not connected with the sclera. While there was no abnormal pigmentation on the globe, there was a distinct, clear, flat, nonpigmented and colloidlike elevation between the edge of the tumor and the corneoscleral margin. Microscopic examination showed melanotic sarcoma with irregular alveolar arrangement of closely packed cells.

In the treatment of this condition, Morton holds hesitation as regards enucleation to be justifiable. Thorough fulguration and radium after extirpation are recommended. In the case reported the large area left by removal was thoroughly curetted and completely covered by large Kuhnt flaps.

The literature is reviewed and two other cases of sarcoma not heretofore reported are presented. Differential diagnosis, frequency of return of the growths, and metastasis are discussed.

George H. Stine.

Roy, J. N. **Voluminous osteoma of the orbit.** Ann. d'Ocul., 1930, v. 167, Oct., pp. 825-832.

An osteoma, 48 mm. in length and 8 cm. in greatest circumference, was removed from the orbit of a sixteen-year-old girl without interfering with vision.

Lawrence T. Post.

Santanastaso, A. **On fatty degeneration of the human eye.** Ann. di Ottal., 1930, v. 58, Aug.-Sept. p. 734.

The deposition of fat in the human eye has been described by authors as xanthomatosis bulbi. It is characterized by an orange-yellow mass found in the anterior segment of the globe. Two typical cases are presented; both followed long existing traumatisms.

Cholesterin crystals are occasionally present in the anterior chamber of the normal eye. In the first case a grayish-yellow substance nearly filled the anterior chamber and prevented an examination of the fundus. The slit-lamp demonstrated crystals on the iris. After enucleation of the eye, in the second case, special stains showed a like yellowish mass to consist of neutral fats, saponified fatty acids and pigmented lipoids.

Cholesteremia is found in those cases which often originate from a remote lesion such as an exudative pleuritis. The cholesterin fats separate into cholesterin and the soluble fatty acids, the end products of which are absorbed in the form of soaps. One part remains as a calcic soap, which is an intermediate between lime phosphate and carbonic acid. This is found in the cornea as corneal atheromatosis. In the vessel walls one part of the fatty acids remains insoluble and thus the way is prepared for final ossification of the choroid, which was found, together with neoplastic tissue, in each of the cases reported. (Plates, bibliography.)

Park Lewis.

Siemund, Heinrich. **A case of lymphomatous affection of the conjunctiva.** Klin. M. f. Augenh., 1930, v. 85, Dec., p. 753.

A woman aged fifty-three years presented a mushy thickening of the conjunctiva of the right upper lid, with small round greyish-red follicular nodules and mucopurulent discharge, which contained leucocytes and lymphocytes. In an excised piece a neoformation of lymphoid type was found, partly with traces of follicles but mostly in the shape of diffuse lymphoid infiltration with large lymphoblastic cells. These last two conditions suggested that it was perhaps not a mere leukemic tumor but in process of leucosarcomatous conversion. Some improvement was obtained in nine months by roentgen-ray treatment.

C. Zimmermann.

Tiscornia, B. J. **Palpebral involvement by hemorrhagic sarcomata of Kaposi.** Arch. de Oft. de Buenos Aires, 1930, v. 5, Sept., p. 392.

A sixty-year-old man, eight years previously, had noted the development of several nodules on his hands and forearms, others later appearing in various portions of the body. These varied in size from small hard grayish red plaques to tumors of various sizes up to that of a small orange. The external ears were filled with coarse ridges and nodules resembling leprosy, which indeed it was at first supposed to be. His hands were enormous, being practically twice the normal size, this being due to a hard edema that extended from the wrists down. Their surfaces were covered with ulcerated nodules that had become secondarily infected.

Arising from the lower lid of the right eye, and hanging down over the cheek to the level of the tip of the nose, was a reddish lobulated tumor, from the crevices of which came a hemorrhagic discharge. The weight produced ectropion and lagophthalmos.

The lid mass was excised and its base cauterized, but the growth recurred one month later. The malignant invasions occurred in various parts of the body until he came to autopsy several months later. The invasion by sarcomata was then found to have been quite general. The sections showed the typical picture of hemorrhagic sarcoma of Kaposi, which very rarely has been known to involve the lids.

A. G. Wilde.

Wagener, H. P., and Wellbrock, W. L. A. **Benign melanoma and melano-**

epithelioma of the choroid. Arch. of Ophth., 1930, v. 4, Oct., pp. 509-515.

Benign melanomas of the choroid have frequently been observed. They are flat, slate gray, or blue-ointment-colored patches. The authors observed a malignant melanotic tumor originating from malignant transfer of the cells in the central portion of such a benign melanoma. These pigmented nevi of the choroid contain chromatophores and epithelial cells apparently derived from the pigment epithelium of the retina. The authors believe their presence in these nevi to be the result of splitting of the layer of pigmented epithelium of the retina by ingrowth into it of the vascular tissues of the choroid; it is from this split-off epithelium that malignant melanotic tumors of the choroid, especially those that have their origin in benign melanomas, arise. The writers differentiate between pigmented and nonpigmented benign nevi of the retina, corresponding to pigmented and nonpigmented nevi of the skin. *M. H. Post.*

Wätzold, Paul. **Further contribution to the pathogenesis and clinical aspect of choroidal sarcoma.** Graefe's Arch., 1930, v. 124, p. 139.

The author's observations and those of Seefelder prove that, because choroidal sarcoma may be accompanied by very early migration of tumor cells along the lymph channels through the sclera, it has a great tendency to metastasize at a very early stage. The author finds that in the majority of early cases where migration of tumor cells along the lymph passages through the sclera did not occur there was no formation of metastases nor death through metastases. A case reported by the author as well as other cases observed appear to indicate that in choroidal sarcoma removal of the primary tumor by enucleation may lead metastases to retrogress and disappear without exenteration of the orbit being necessary. A successful result cannot however be said to have been obtained unless metastasis has not occurred within seven or even better ten years from the time of operation. *H. D. Lamb.*

16. INJURIES.

Badot, J. **Ocular lesions due to accidents in workers in the glass industry.** Bull. Société Belge d'Opht., 1930, no. 60, p. 10.

These lesions vary extremely in seriousness. The author notes the extra hazard of even superficial corneal wounds in cases of dacryocystitis. Hot particles of glass cause wounds that require longer to heal. Careful examination with the corneal microscope is a most useful aid to diagnosis. The treatment outlined does not differ from the classical treatment of corneal and scleral wounds due to other substances than glass. Conjunctival flaps are recommended in appropriate cases.

It is noted that small bits of glass may be tolerated by the eye indefinitely. Coppez mentioned a case in which a small bit of glass lodged in the vitreous just back of the lens and was tolerated for thirty years. There was no inflammation and the vision was useful. Another patient carried a small bit of glass in the iris without irritation for twenty years.

Kleefeld called attention to the use of ultraviolet light to demonstrate the presence of glass in the lens substance. When ultraviolet light is used for illumination the bit of glass, being nonfluorescent, becomes "invisible"; its form and limits are indicated by the fluorescent lens substance in which it is imbedded. *J. B. Thomas.*

Burke, J. W. **Removal of glass from anterior chamber.** Trans. Amer. Ophth. Soc., 1930, v. 28, pp. 53-60.

For removal of glass from the anterior segment of the eye, the incision should be made well back in the sclera, on a plane just anterior to that of the iris. As to instillation of atropin, it is advisable not to force the iris nearer the limbus, with the greater chance of having to do an iridectomy, for this should be avoided if possible in so un-

favorable a location, and most of the cases have to be attacked from below.

Edward G. Lear.

Handmann, M. **Historical and critical remarks on Vossius' annular opacity of the anterior capsule after contusions.** Klin. M. f. Augenh., 1930, v. 85, supplement, p. 79.

After a review of the literature and reports of eight clinical cases, the author summarizes as follows: The theory of Vossius of a stamp of the pupil on the anterior capsule must be definitely given up. It is a ring-shaped or disc-shaped deposit from the aqueous upon, and an impregnation of, the anterior capsule, owing to a preformed roughness and porosity of the pupillary area of the capsule, which is apt to retain corpuscular elements from the aqueous. Its rarity may perhaps be explained by individual varieties in the finer structure of the anterior capsule. The substratum of the ring may be pigment, but is more likely blood.

C. Zimmermann.

Langdon, H. M. **Absorption by radium of intraocular granulation following stab wound at the corneal limbus.** Trans. Amer. Ophth. Soc., 1930, v. 28, pp. 116-117.

A boy of five and one-half years had the point of a knife enter his right eye at the lower limbus. Two days after the injury the eye was quiet, with a prolapse of the iris, which just reached the lip of the wound but did not protrude beyond. Lens and vitreous were clear. A month after the accident the vision was limited to hand motions at one foot. This was due to a dense veil which had grown upward behind the lens, apparently connective tissue coming from the inner aspect of the wound. The mass had a delicate floating or waving motion when the eye was rotated and it was too thick to allow a view of the fundus.

Treatment by radium was used over the lids, eight treatments in all. The final examination showed the lower half of the retina detached, macular involvement in the form of connective tissue, vision of 3/60. The lens was clear, the granuloma entirely gone, and the tension normal to palpation.

Edward G. Lear.

Marx, E. and Quartero, A. E. **Fluctuations of intraocular pressure after contusion of the eye.** Klin. M. f. Augenh., 1930, v. 85, Dec., p. 758.

The left eye of a boy aged thirteen years was hit by a piece of coal and immediately lost all vision. The anterior chamber was filled with blood and the intraocular tension zero. Under atropin the media soon cleared up. The retinal arteries were normal but the veins thick and tortuous. There were a number of ruptures of the choroid more or less concentric with the disc. Around the disc was a ring 2 mm. wide and bulging 3 D., apparently a detachment of the choroid under which blood from its vessels had accumulated, but without detachment of the retina. The blood gradually oozed through choroid and retina and assumed the shape of radial stripes in the nerve fiber layer. On the twenty-first day the patient complained of pain, and tension had risen to 130 mm. Under pilocarpin it became normal and then so low that it could not be measured with the tonometer. These fluctuations occurred four times with impaired vision and headache during the rise, until after four weeks the tension remained normal. A slight myopia with astigmatism had developed, with normal vision after correction. Apparently this was caused by changed position of the lens, the suspensory ligament being torn during the injury. The softness of the eye is explained by spasm of the bloodvessels from irritation of the sympathetic nerves in the choroid, and the increase of tension by relaxation of the nerves with subsequent dilatation of the vessels.

C. Zimmermann.

Morax and Chiazzaro. **Concerning the absorption of metallic magnesium in the organism and especially in the eyeball.** Ann. d'Ocul., 1930, v. 167, Oct., pp. 809-815.

Experiments of introduction of magnesium metal into the anterior chamber, vitreous, and subconjunctival and subdermal tissues were performed. A 1.2 mg. piece placed in either aqueous or vitreous was rapidly absorbed. No trace of the substance could be found in the aqueous after 15 days. The eyes were not damaged in the process. Absorption subconjunctivally or subdermally was only one-twentieth as rapid. The pH content of the aqueous was not altered. *Lawrence T. Post.*

Pflugk, Albert. **Treatment of injuries from aniline pencil.** Klin. M. f. Augenh., 1930, v. 85, Nov., p. 669.

After thorough removal of the particles with the foreign body needle and irrigation with peroxide of hydrogen, the eye is radiated with the lamp of Birch-Hirschfeld for ten minutes at 15 cm. distance under irrigation with physiological salt solution. In more intense cases peroxide of hydrogen and the lamp are applied twice a day. A bandage is applied with cocaine salve 3 percent. All cases thus treated healed smoothly in a few days.

C. Zimmermann.

Wolff, J. **Five cases of self-mutilation of the eyes with aniline pencils.** Klin. M. f. Augenh., 1930, v. 85, Oct., p. 548.

Self-inflicted injury of the eyes by insertion of pieces of aniline pencil into the conjunctival sac is today a favorite method of prisoners in order to regain liberty. Five cases are reported in former inmates of prisons, who mutilated their eyes in this fashion and after a time came to the hospital for treatment. All injured eyes (8) showed more or less extensive symblepharon, 4 were entirely blind (2 of these had to be enucleated), 2 were practically blind. The foreign body had been left in the conjunctival sac from one day to several weeks. In case four, in which bilateral enucleation was necessary, the particles remained twenty-four hours in the right and six days in the left eye. In case three, with both eyes blind, four days intervened between injury and first treatment. The results of these cauterizations demonstrated that in severe cases the prognosis is serious and that loss of the eyes in spite of treatment cannot always be prevented.

C. Zimmermann.

17. SYSTEMATIC DISEASES AND PARASITES

Adams, Dorothy R. **A study of the correlation between the biochemical and intraocular changes induced in rabbits by the administration of naphthalene.** Brit. Jour. Ophth., 1930, v. 14, Nov., p. 545.

The ocular lesions are of such a nature as to suggest that they may be due to a disturbance in the normal physiological balance of the body, rather than to a specific toxic action of the naphthalene or one of its derivatives. This communication concerns itself with variations in certain normal constituents of the blood after the administration of naphthalene. Of the three constituents investigated—sugar, cholesterol, and calcium—only the last showed any marked change. For the purpose of experimentation rabbits were used and the naphthalene was administered in warm parafine.

The variation in blood-sugar is set forth in tables. The conclusion arrived at is that there is no correlation between the nature of the intraocular changes and the type of variation which occurs in the blood sugar after naphthalene. From the results of variation in blood cholesterol, shown in the tables, it appears that naphthalene gives rise to a slight degree of hypercholesterinemia during the first week of administration. Unfortunately, the animals used only developed partial lens opacities, but the figures obtained did not suggest that a marked rise in blood cholesterol would occur with the development of complete cataract. The more marked variation in blood calcium, as indicated in the tables shown, is summarized as follows. The process of retinal exudation is accompanied by a definite disturbance in the blood-serum calcium. The significance of this

can only be made clear by further experiments, but, in view of the fact that a similar change occurs also in retinal exudation due to quinoline, it is probably of some pathological importance.

In the second section of the contribution, devoted to the metabolism of naphthalene and the action of its derivatives, the author reaches the following conclusions: In the case of all substances administered with naphthalene it is difficult to design a real control experiment, but it would appear that glucose undoubtedly accelerates the effects of naphthalene, while potassium oxalate also does so but possibly in a different way. Calcium lactate probably favors the deposition of crystals by helping to maintain a normal blood calcium. *D. F. Harbridge.*

Axenfeld, T. **Localization of intraocular tuberculosis, and juvenile angiopathy.** Klin. M. f. Augenh., 1930, v. 85, Oct., p. 465.

In this lecture delivered before the Pan-Japanese Medical Congress at Osaka, the late Professor Axenfeld spoke on group localizations of hematogenous tuberculosis of the eye. In Europe tuberculosis doubtless participates in the relapsing phlyctenular keratoconjunctivis. After tuberculosis has settled in the bronchial glands ocular scrofulosis appears as phlyctenules and affections of the cornea with a disposition to formation of new blood vessels. It is peculiar that this group localization furnishes a certain immunity to destructive tuberculosis of other organs and to intraocular tuberculosis. The greatest part of all chronic inflammations of the uvea and of the adjoining sclera are according to Axenfeld's experience tuberculous, not due to focal infection. A frequent exclusively retinal affection due to tuberculosis is juvenile angiopathy, tuberculous periphlebitis of the retina with relapsing hemorrhages. Apparently the bacilli penetrate the venous walls without damaging them, or are transported from the intact capillaries into the perivenous lymphatic sheaths. *C. Zimmermann.*

Bayne-Jones, Stanhope, and Lerner, M. L. **Ocular lesions of rat-bite fever in guinea-pigs.** Arch. of Ophth., 1930, v. 4, Dec., pp. 858-867.

The resemblance of the ocular lesions of animals with rat-bite fever to periodic ophthalmia in horses led the authors to investigate these lesions. A little study indicated, however, that there was no common etiology and little in common pathologically between the two conditions. Spirocheta morsus muris was used to produce the condition in guinea-pigs. About 60 percent of the inoculated animals developed characteristic ocular morphology, which was most severe at the time when the animals became moribund. They suffered from blepharitis, conjunctivitis, interstitial keratitis with corneal ulceration, moderate iritis and cyclitis. There were also characteristic cellular infiltrations in the lacrimal glands, especially in the neighborhood of the ducts, and about the vessels in the external ocular muscles. These spirochetes were found in the conjunctival exudate, but not with certainty in the corneal stroma. *M. H. Post.*

Nichelatti, Paolo. **Two additional cases of conjunctival myiasis from the larva of the Oestrus ovis.** Ann. di Ottal., 1930, v. 58, Nov., p. 1001.

In recent years the published cases of conjunctivitis produced by the Oestrus ovis, the gadfly or botfly, have been sufficiently numerous to demonstrate that such affections are more frequent than has been commonly supposed. The fly has been known to deposit its larva while flying, in the eyes, in the nasal cavities or on the lips of Algerian shepherds.

The majority of cases of conjunctival myiasis have been recognized as due to larvæ of the Oestrus, although other varieties have also been recognized. The Oestrus is a little greyish-yellow fly 11 to 13 mm. long, found throughout the world where there are sheep and goats. It is especially prevalent between the months of June and October. Two additional cases are here reported,

marked by intense conjunctival hyperemia with burning pain. The minute active larva was discovered only by the aid of a loupe, and was removed from the conjunctiva with difficulty. On its head are two chitinous hooks by which it clings to the membrane.

Park Lewis.

Terson, A. **Visual hallucinations in diseases of the eyes.** Ann. d'Ocul., 1930, v. 167, Oct., pp. 815-825.

This condition is very rare and when found a relationship cannot surely be demonstrated between the two. On the other hand lesions of the cuneiform or temporal areas of the brain are regularly associated with visual hallucinations.

Lawrence T. Post.

Van Cannyet, J. **A comparative study of the reactions of complement fixation and of Kahn on the aqueous humor and blood of syphilitic hares.** Bull. Société Belge d'Opht., 1930, no. 60, p. 66.

This piece of work professes a double purpose:

(1) To discover whether the aqueous humor of apparently normal hares and that of syphilitic hares free from ocular lesions takes part in the specific colloidal modifications which one can demonstrate in the blood of these animals by means of the reaction of Kahn or of complement fixation.

(2) To discover whether the syphilitic affections of the eye, especially of the cornea of the hare, provoke the development of these reactions in the blood and especially in the aqueous humor.

Van Cannyet's conclusions were:

(1) The so-called syphilitic antibodies seem not to pass from the blood plasma of the hare into the anterior chamber of the eye; thus it would appear that the capillary barrier of the uvea and retina are impermeable from within outwards.

(2) The presence of active syphilitic lesions of the cornea (twenty-five cases —with or without treponemas visible in the aqueous humor), of the conjunctiva (three cases), or the lid (one case) does not modify the negativity of the Kahn or Wassermann tests of the aqueous humor, even after repeated puncture.

At the same time it is hard to determine whether and in what measure these lesions exert an influence either to beget or to intensify the positivity of the fixation reactions in the blood.

The observations of the author agree with the known relations between the blood and aqueous. These observations also confirm the admitted analogy between the dialyzing functions of the uvea and retina on one hand, and of the capillaries of the leptomeninges and of the cerebral or medullary parenchyma on the other. (Five tables of experimental data.) *J. B. Thomas.*

18. HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Duke-Elder, W. S. **An investigation into the effect upon the eyes of occupations involving close work.** Brit. Jour. Ophth., 1930, v. 14, Dec., p. 609.

This investigation concerns itself with 244 printers' apprentices aged fourteen to twenty years. Four successive examinations, at intervals of nine months, were conducted. Observations were made of the visual acuity, the refractive error, the power of accommodation, the muscle balance, and the degree of binocular and stereoscopic vision. In the group were compositors, machinists, binders, lithographers, stereotypers, and general students.

A résumé of the results is presented in statistical form. Reviewing the figures, it is obvious that the compositors do not well bear comparison with those engaged in other occupations. Not only do they present initially a considerably higher percentage of myopes, but the number in which the refractive error increases towards myopia is also higher. Moreover, the percentage suffering from a considerable amount of muscular imbalance is higher.

D. F. Harbridge.

Friedenberg, Percy. **Ocular hazards and safeguards.** Trans. Amer. Ophth. Soc., 1930, v. 28, pp. 249-268.

The term factor, or, more correctly, margin of safety, as well as the principle implied, was taken from engineering practice and applied to the human economy by Meltzer a generation ago.

The double representation of the organ of vision is perhaps the most important, as it is the most striking, factor of safety against complete loss of sight. The loss of one eye, however, at once and irrevocably wipes out the safety margin or reserve provided by nature. The subject has now but one eye left between himself and blindness.

Various means of reducing the hazard or increasing the factor of safety are discussed, including early and effective treatment of surface inflammations and affections, conjunctival and palpebral; the radical removal of extraocular sources of infection; early and skillful treatment; and proper training of future physicians in the necessary details of eye examination and minor surgery. *Edward G. Lear.*

M. Menacho. **The psychovisual requirements of automobile drivers.** Arch. de Oft. Hisp.-Amer., 1930, v. 30, June, p. 310.

Good central visual acuity is not sufficient for a driver. He must possess depth perception and have at least seventy degrees of visual field temporally. A glaucomatous person with fields contracted to five degrees is a dangerous person even if he possesses normal central acuity. On the basis of a study of average speed of drivers, effectiveness of brakes, and conditions of traffic, the author proposes the following requirements: The sum of the uncorrected acuities of the two eyes in professionals should be not less than 20/20, and the poorer eye should have at least 20/100, thus if one eye has 20/40 the other eye must have at least 20/40. The same, if corrected, is required of private owners. Intact fields increase the efficiency of an eye with low acuity in night driving. The author would disqualify all cases of strabismus, whether concomitant or paralytic; and also persons with hemeralopia, trachoma, or any other condition subjecting the sufferer to lacrimation. In view of the great prevalence of red-green blindness he would substitute for or incorporate with the lights used for traffic signals large size figures to indicate their purpose. An X in black over white would serve to halt traffic, two parallel lines to signal "go", and a large question mark would stand for attention. *M. Davidson.*

Safar, K. **Eye diseases during childhood.** Wiener klin. Woch., 1930, v. 43, Oct. pp. 1217-1244.

The author mentions the diseases of the eye found in children, also the malformations. He emphasizes that cataracts in children should be taken care of as soon as possible. He mentions cranial deformities and the associated eye conditions. Some questions in refraction and strabismus are discussed. *Beulah Cushman.*

Seefelder, R. **The expression and beauty of the eyes.** Wiener klin. Woch., 1930, v. 43, April, p. 512.

The author takes up in detail the expression and beauty of the eyes in the facial picture and quotes extensively from Ovio and Oppenheimer, and also describes a number of paintings, as to the way in which the eyes have been treated. *Beulah Cushman.*

NEWS ITEMS

News items in this issue were received from Drs. C. A. Clapp, Baltimore; E. D. LeCompte, Salt Lake City; M. P. Motto, Cleveland; G. Oram Ring, Philadelphia; and C. P. Small, Chicago. News items should reach **Dr. Melville Black,** Metropolitan building, Denver, by the ninth of the month.

Deaths

Dr. Oscar Dowling, New Orleans, aged sixty-five years, was killed January second by a train aboard a ferry in that city.

Dr. Elmer T. Boyd, Denver, aged sixty-seven years, died November 24, 1930, from a perforating ulcer at the site of a gastroenterostomy.

Dr. Hiram Woods, Baltimore, aged seventy-three years, died January fifteenth of pneumonia.

Dr. Edgar S. Thomson, New York, surgeon director of the Manhattan Eye, Ear, and Throat hospital, is dead at the age of fifty-nine years. His death was caused by cerebral thrombosis.

Miscellaneous

Elihu Root has been elected honorary president of the National Society for the Prevention of Blindness, to succeed the late William Howard Taft.

Illinois and Colorado have bills in their state assemblies for the creation of laws to require the use of the Credé method in the eyes of the new-born.

Societies

At the annual election of officers of the Ophthalmological and Otolaryngological Section of the Cleveland Academy of Medicine, Dr. William V. Mullin was appointed chairman and Dr. H. C. Rosenberger secretary and treasurer of this society.

The Chicago Ophthalmological Society held its annual meeting January nineteenth. Dr. Harvey J. Howard was the guest of honor and addressed the society on some of the projects on research which were being undertaken in the reorganized department of ophthalmology in Washington University. Dr. Frank Brawley was elected president of the society for the ensuing year.

The International Organization for the Campaign against Trachoma desires to establish a comprehensive library on trachoma. Authors writing on trachoma are therefore requested to furnish the International Organization with one or preferably two copies of their work, which should be addressed to the general secretary of the organization, F. Wibaut, P. C. Hoofstraat 146, Amsterdam, Holland.

The eighth annual postgraduate course in ophthalmology, all in English, will be given in Vienna between October 1 and December 3, 1931, under the auspices of the American Medical Association of Vienna at the first and second eye clinics of the Allgemeines Krankenhaus. The usual courses will be given, including operations by Meller; refraction and skiascopy with cylinders, and trachoma, by Lindner; normal histology, histopathology, anatomy of fundus diseases, examination and history of ophthalmology by A. Fuchs; neurology of the eye, diseases of muscles, and field of vision, by Bachstez; anatomy of the orbit, ophthalmoscopy, operations and photography of the fundus, by Guist; external diseases, and bacteriology, by Pillat; therapy, and slit-lamp, by Urbanek; ophthalmoscopy, also with red-free light and physiology, by Fischer; external diseases, and compensation and simulation by Böck; comparative ophthalmology by Kolmer; roentgen rays by Schüller; hypophysis and sinuses by Hirsch; West operation by Kofler; radium treatment by Fuchs; embryology of the eye by Politzer; practical skiascopy with cylinders, and velonoskiascopy, by Subal. The course is given for a minimum of ten and a maximum of sixteen entrants. The fee is $250.00 per entrant. Application with certified check for $50.00 should be sent to Professor A. Fuchs, Vienna, VIII, Skodagasse 13. Applications are accepted in the order of their receipt. Further information may be obtained from Professor A. Fuchs; or from the American Medical Association, Vienna, VIII, Alserstrasse 9, Café Edison.

Personals

Dr. William E. Gamble of Chicago has been in Florida for a few weeks' vacation.

Dr. R. D. West, of Baltimore, recently returned from a winter vacation in Florida.

Dr. Edward G. Lear of New York has been spending the winter in Porto Rico, on account of arthritis.

Dr. Wm. F. Wilmer recently gave an address at the graduating exercises of the Army Medical School.

Dr. William H. Luedde has been appointed to the administrative board of the Saint Louis University School of Medicine.

At the annual banquet meeting of the Sebastian County Medical Society of Fort Smith, Arkansas, held December thirtieth, Dr. H. Moulton was presented with a large bouquet of roses in honor of his seventieth birthday.

At the November meeting of the Cleveland Ophthalmological Club, Dr. W. L. Benedict, professor of ophthalmology at the Mayo Clinic, Rochester, Minnesota, gave an exceptionally thorough presentation on "Tumors and pseudotumors of the orbit".

Dr. L. Webster Fox has been very ill, but early in February was sufficiently improved to go to Atlanta to recuperate.